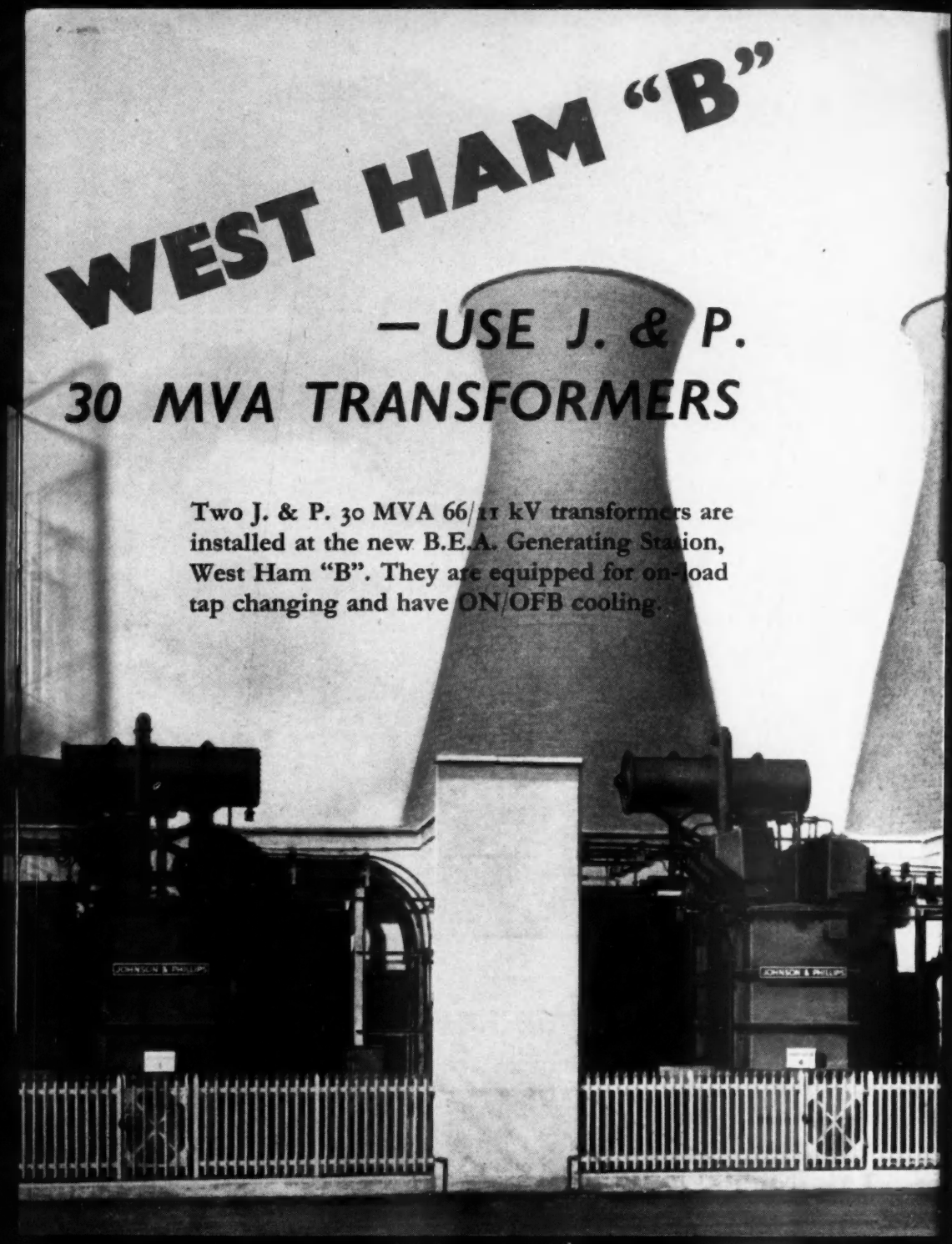
ELECTRICAL TIMES

THURSDAY
18 OCT.
1951
NINEPENCE

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2


WEST HAM "B"
— USE J. & P.
30 MVA TRANSFORMERS
Two J. & P. 30 MVA 66/11 kV transformers are installed at the new B.E.A. Generating Station, West Ham "B". They are equipped for on-load tap changing and have ON/OFB cooling.
JOHNSON & PHILLIPS
JOHNSON & PHILLIPS LTD.
CHARLTON LONDON S.E.7
The mark that means that "little more" in quality

ELECTRIC MOTORS?

Everyone comes to L.S.E. in time ☆

Everyone who has to deal with electric motors comes to L.S.E. eventually.

Some come regularly for the fine range of standard machines —a range wide enough to meet many requirements that are quite a bit out of the ordinary.

Others come for machines such as the **'N-S' variable speed** a.c. motor (which can be made very nearly to think), the **'Trislot'** squirrel cage motor for **high torque** or low starting current applications, the **'Speedmaster'** for variable speed squirrel cage motor grouped drives, **direct current motors** with amazing speed/torque capabilities . . . but perhaps we had better send you some details?

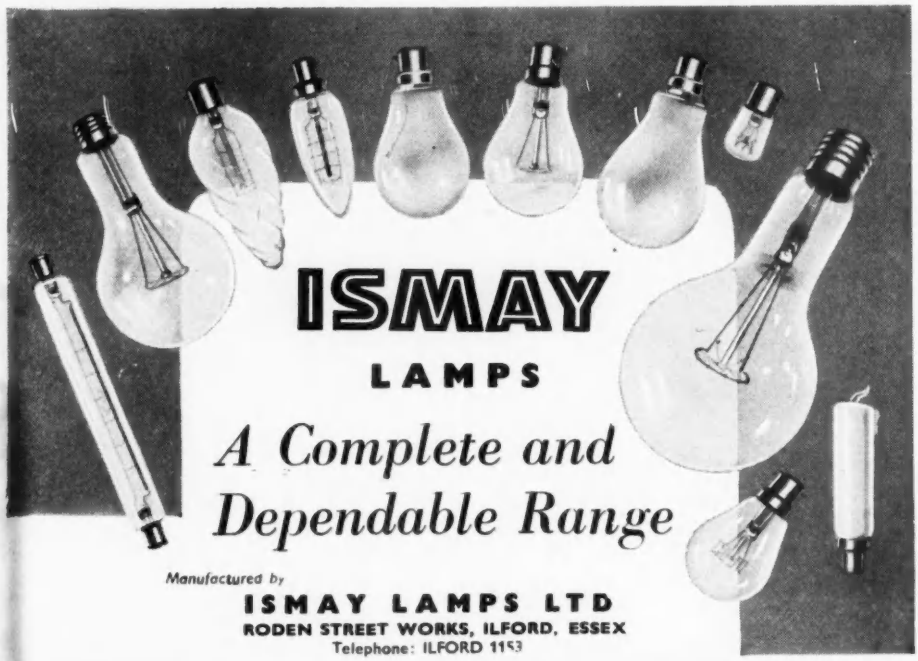
☆ Sometimes there is quite a queue, so if you are thinking of coming, *please come early.*

LAURENCE, SCOTT & ELECTROMOTORS LTD.

Makers of Electric Motors since 1883

MANCHESTER NORWICH LONDON AND BRANCHES

A



Manufactured by
ISMAY LAMPS LTD
RODEN STREET WORKS, ILFORD, ESSEX
Telephone: ILFORD 1153

The RONNING SAFETY ELECTRIC Footwear
DRYER and WARMER

ONE YEAR'S GUARANTEE

Gently dries overnight, restores **WET BOOTS, SHOES, WELLINGTONS, WADERS, SEA BOOTS.** Frees footwear from perspiration. Of great use to all whose work or sport takes them out of doors in all weathers, and to the elderly and rheumatic.

Generates only 8W., 210/250 A.C./D.C.

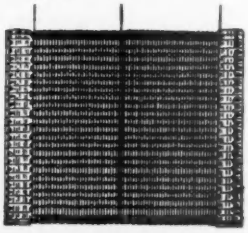
RETAILS AT £2.0.0 including P.T.

From your usual Wholesaler or from:—

RONNING & COMPANY
7 YORK PLACE, ADELPHI, LONDON, W.C.2

ASBESTOS WOVEN
WIRE RESISTANCE NETS

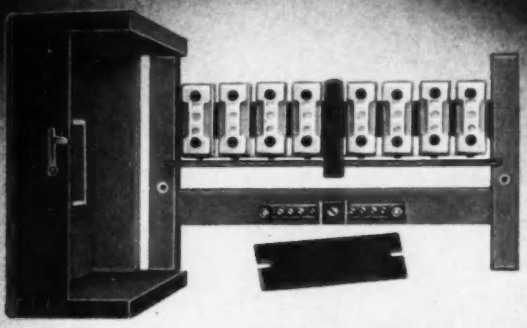
Speedily supplied from stock, or 'made to measure' at a cost that will please you. Our Technical Service will help you with any problems.



CRESSALL

Registered Trade Name of—
The CRESSALL MANUFACTURING CO., LTD.
Tower Street, Birmingham 19
Telephone: ASTon Cross 2666 (3 lines.)
Telegrams: OMHIC, BIRMINGHAM

You cannot buy better gear



"HINGELESS" HARDWOOD FUSEBOARDS.

MADE FOR 5/15, 15, 20 AND 30 AMPERES, 250 VOLTS. 1-12 WAY. DOUBLE POLE, SINGLE POLE AND NEUTRAL.

MIXED AMPERE FUSEWAYS TO SPECIAL ORDER.

ARC DAMPING TYPE FUSES (REWIRABLE).

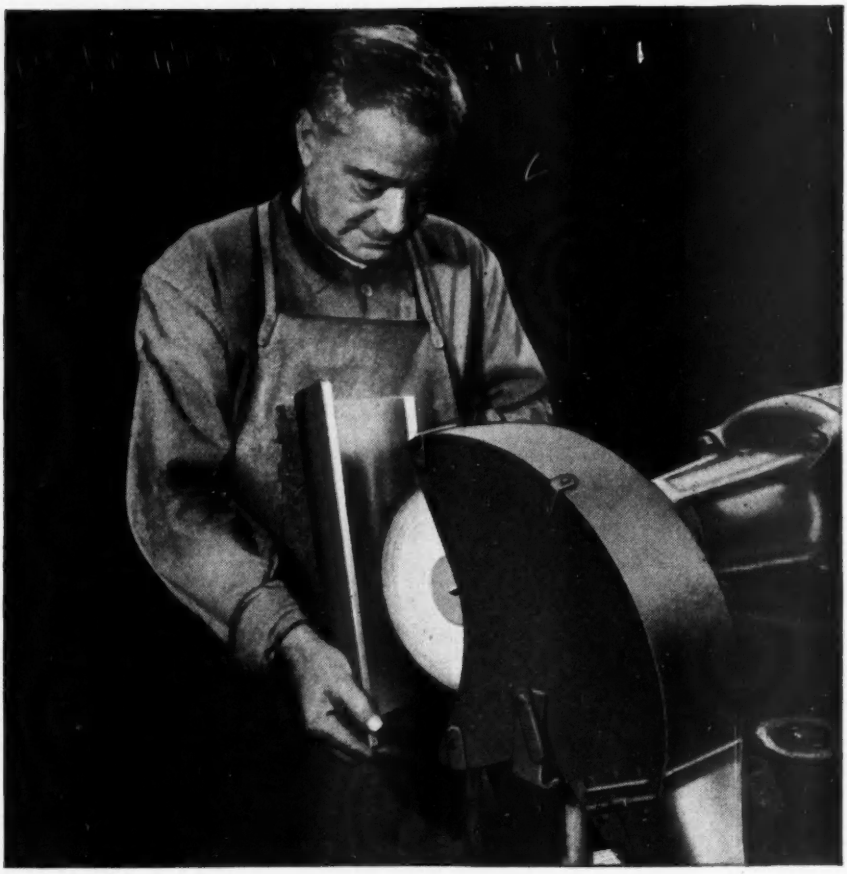
DETACHABLE COVER FOR EASY WIRING.

REASONABLE DELIVERY FROM WORKS OR LOCAL DEPÔT STOCKS THROUGH YOUR USUAL WHOLESALER

FULLY ILLUSTRATED IN NEW CATALOGUE G551 ON REQUEST.

BILL SWITCHGEAR LTD.
ASTON LANE · PERRY BARR
BIRMINGHAM·20

LONDON	BIRMINGHAM.	N.MIDLANDS.	S.MIDLANDS.	N.WEST.	SOUTH	SCOTLAND
A.W.ZELLEY & W.N.PAYNE	C.BAKER.	G.H.GARBETT.	C.G.BACHELOR.	H.H.POLLARD.	W.L.WHITE.	J.D.HARRIS



Other people's jobs

Both power and skill play their part in polishing the reflector of a Belling fire. The job is done on a revolving calico buff, powered by a high revving 5 h.p. motor. The art lies in the skill of the men who do the polishing, men like chargehand George Batt, who has more than 40 years' experience behind him. Like all true craftsmen, he makes a difficult job appear simple. It takes a great deal of care and energy to produce a perfect finish — a quality which Belling insist on in all of their products.

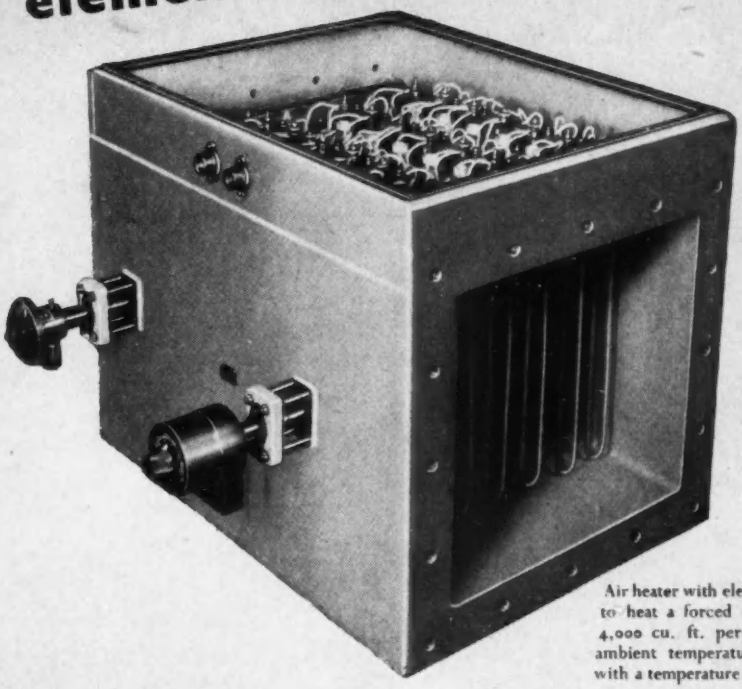
You can't beat a "Belling"

BELLING & CO. LTD., BRIDGE WORKS, ENFIELD, MIDDX. HOWARD 1212

CRC 379

This is the first of a series of six advertisements on Metrovick Industrial Heating Elements

No element of doubt . . .



Air heater with elements designed to heat a forced air draught of 4,000 cu. ft. per minute at an ambient temperature of 850° F. with a temperature rise of 60° F.

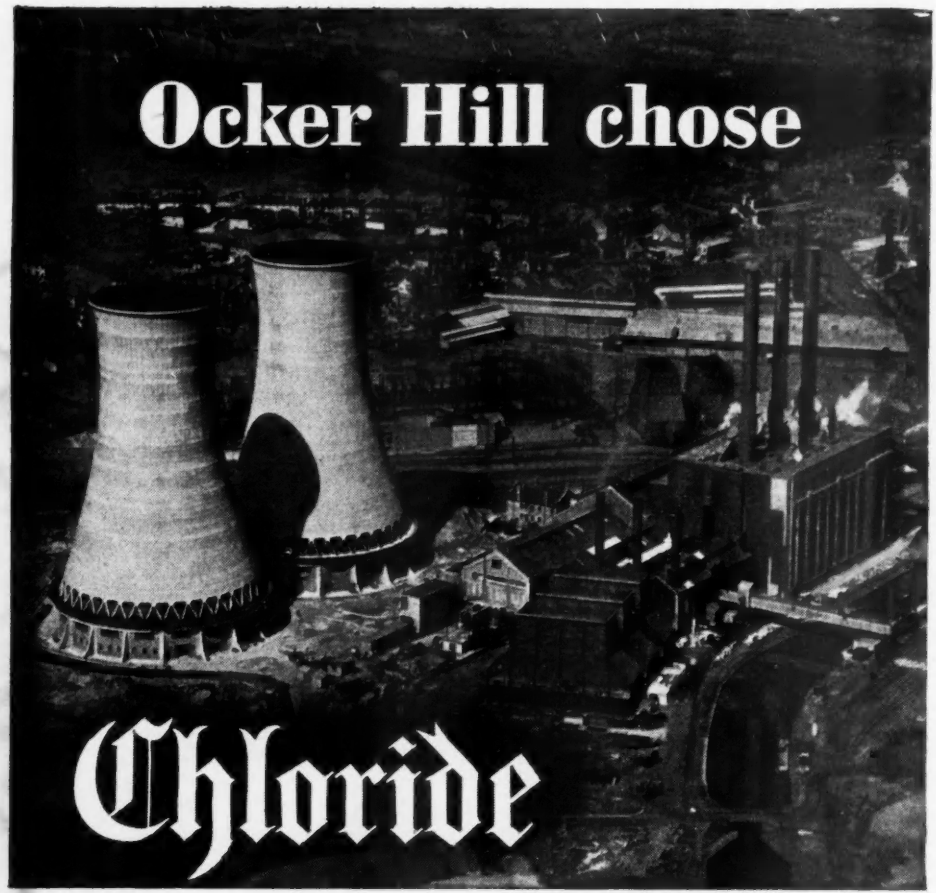
. . . with Metrovick Elements

AIR HEATING

The Metrovick tubular sheathed heating element — as used in the famous "Redrings" for domestic electric cookers — can solve many heating problems in industry. Elements can be supplied suitable for operating in air temperatures of up to 600° C. The construction of the element is such that the outer sheath, which may be supplied in a variety of materials, protects the inner winding from dirt, damp and possibly corrosive conditions, thus ensuring a long trouble-free life under arduous conditions. We can also supply complete air heaters as illustrated. Send for descriptive leaflet 7703/1.

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., TRAFFORD PARK, MANCHESTER 17

METROVICK *"Redrings" for domestic use*



S.57

The battery installation at Ocker Hill, one of the main Generating Stations of the British Electricity Authority, Midlands Division, was provided by Chloride Batteries Ltd. The battery, which is used for emergency lighting, switch operating and switchgear indicating lamps, comprises 115 Chloride Planté cells type GLW12 in wood lead-lined containers and has a capacity of 1,200 ampere-hours at the 10 hour rate of discharge. It is maintained on trickle-charge by charging gear designed and installed by Chloride.

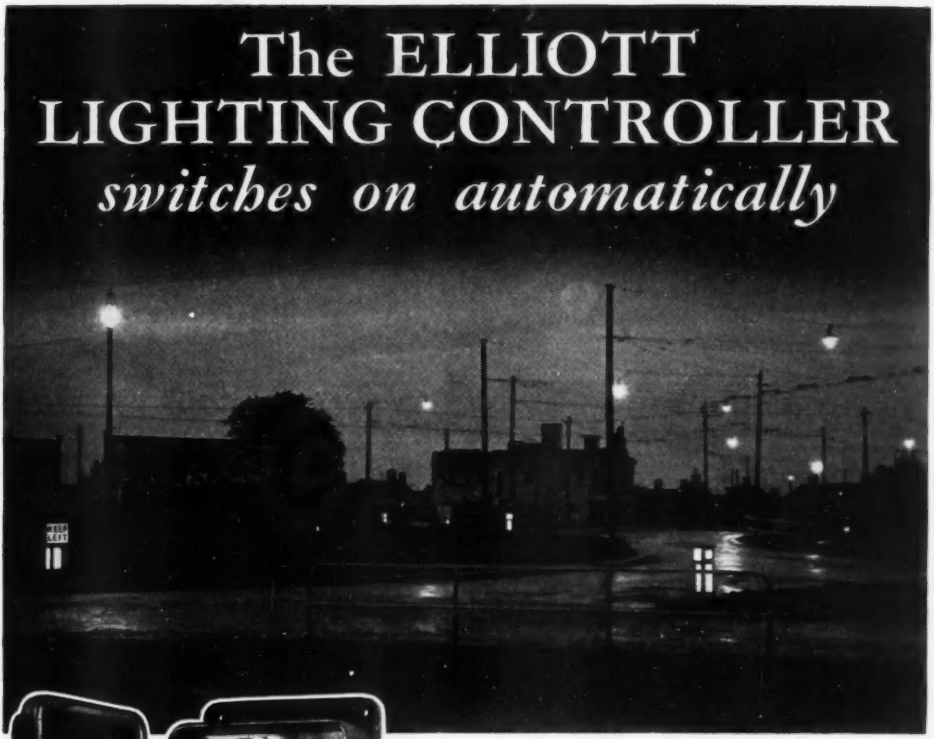
A PRODUCT OF CHLORIDE BATTERIES LIMITED

Exide Works, Clifton Junction, Nr. Manchester, and 137 Victoria Street, London, S.W.1.

MAKERS OF EXIDE BATTERIES

Whenever light is needed . . .

The ELLIOTT LIGHTING CONTROLLER *switches on automatically*



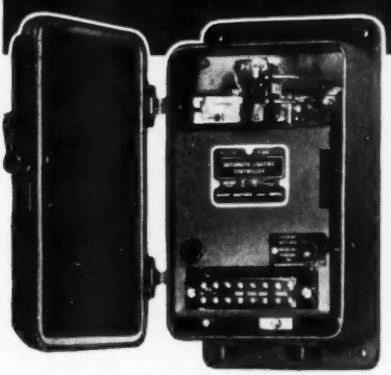


Photo by courtesy of Nottingham Corporation Lighting Committee

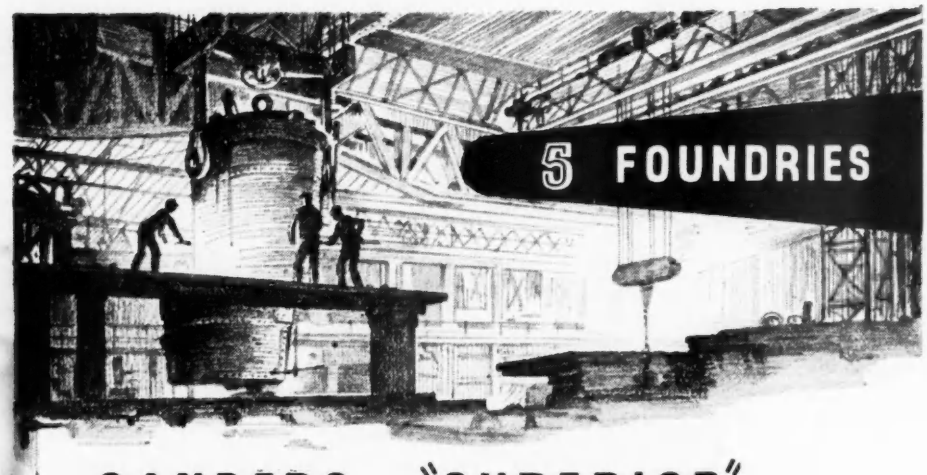
Reliability and simplicity are the keynotes of the Elliott Lighting Control System, which switches on whenever low light values occur, not only at night but also during daylight storms and fog. The system is particularly suitable for remote islands, crossings, etc., as it requires no routine maintenance or resetting. Operation is by means of a barrier-layer photocell and magnetic amplifier—*no valves are employed.*

The Elliott Lighting Controller has innumerable applications in industry, for FACTORY LIGHTING, HARBOUR and DOCK LIGHTING, RAILWAY YARDS, etc.

THE DARK DAYS ARE COMING—WRITE NOW FOR DETAILS OF THE

ELLIOTT AUTOMATIC LIGHTING CONTROLLER

ELLIOTT BROTHERS (LONDON) LTD., CENTURY WORKS, LEWISHAM, LONDON, S.E.13—TIDeway 3232



SANDERS "SUPERIOR"

In quite a large number of foundries, electrical switches are frequently operated by the ungentle hands of men skilled in the tougher side of production, and may it be whispered, sometimes with the nearest available implement. In such situations one so very often encounters the encircled (S) and superscription which marks the Sanders Superior Switch.

These switches rarely complain because they have been brought up to face such conditions, in point of fact, they have learnt through the course of some thirty years, to take impassively, the rough and tumble of life, seeking neither electrical nor mechanical sympathy.

Count them as they catch your eye.

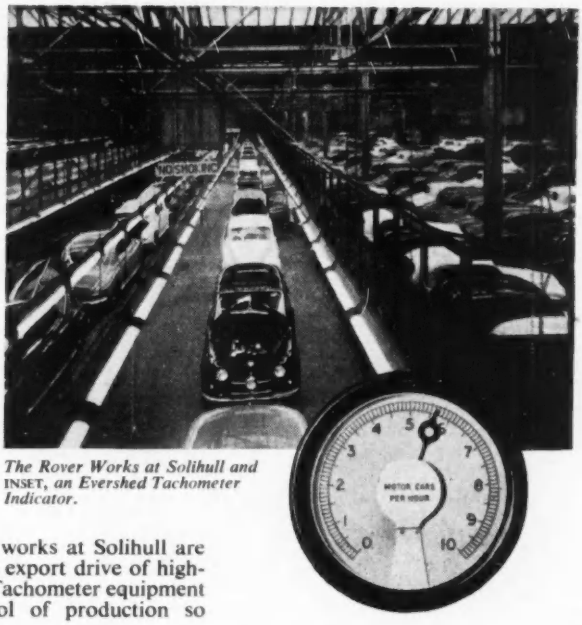
SANDERS
WEDNESBURY

Comprehensive stocks are carried by selected wholesalers in all large centres of population

WM. SANDERS & CO. (WEDNESBURY) LTD., WEDNESBURY, STAFFS.

Evershed Tachometer aids Motor Car Output

"Permanently Visible Check" on Production Lines at Rover Works



The Rover Works at Solihull and INSET, *an Evershed Tachometer Indicator.*

The Rover Car Company, whose works at Solihull are playing so important a part in the export drive of high-quality British cars, use Evershed Tachometer equipment to aid in the centralised control of production so essential in a full-out effort.

An Evershed Tachometer transmitter is coupled to the driving motor of a King Conveyor. From this motor a shaft running beneath the floor drives four production lines—Body and Paint, Trim Finish, Chassis and Mount, and final inspection and polish—which are spread in parallel across the really vast shop. The transmitter is linked to an Evershed Tachometer Indicator in the centrally placed Production Manager's Office, and to an Evershed Tachometer Recorder in the Chief Planning Office.

The Indicator serves as a "permanently visible check" on the four production lines mentioned, while the Recorder supplies the Company's planners with a permanent always-at-hand record of this information. The Indicator is particularly useful at present in showing power load shedding, which causes the driving motor speed to fall, as a fall "cars per hour" reading : so that steps can be taken at once to bring the motor up to normal speed again.

Evershed Tachometers have a variety of applications throughout industry to provide similar checks upon current production in terms either of machine speeds or labour output : and to record this information in a permanent form as a basis for economical planning. *Full details will be found in Publication J224.*

"Four Advantages" of Evershed Recorder

A small electricity undertaking states that its Evershed Chart recorder has "four advantages."

1. Comparisons of increase of load and period of increase can be made.
2. Load indication helps efficient plant operation—sets of different capacity can be arranged as required.
3. Recordings prove operation times and approx. kW demand of certain large users.
4. Exact time can be proved of any rare interruption of service through minor faults.

Evershed Recorders are described in Publication J222.

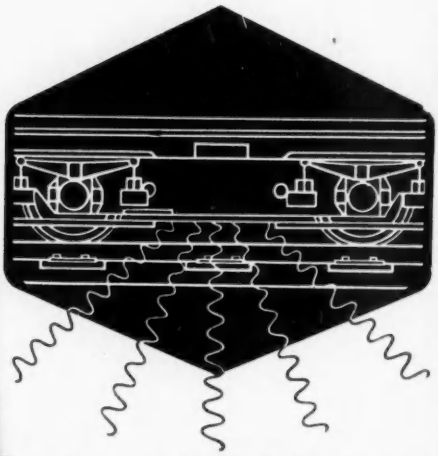
STEEL TUBE *production at Jarrow is aided, too, by Evershed instruments—a Recorder detailing power consumed on any single tube, and peak loads and times with any class of steel: and a Speed Indicator in constant use.* Send for Publication J222 (Recorders): Publication J224 (Tachometers).

EVERSHED

PROCESS CONTROLLERS · INDICATORS AND RECORDERS
REMOTE CONTROLLERS · MEGGER TESTERS

EVERSHED & VIGNOLES LTD Acton Lane Works, Chiswick, London, W.4
Telephone: Chiswick 3670 *Telegrams:* Megger, Chisk, London *Cables:* Megger, London

6/3



Reduce VIBRATION with Metrovick gears

Metrovick resilient traction gears are designed to increase motor life by reducing the effects of track vibration. Design and manufacture of traction gears must be directly related to the design of the traction motor. Metrovick experience in the production of traction motors therefore means that M-V gears incorporate all those features arising from practical traction needs.

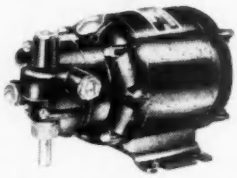
Metrovick rubber resilient gear wheels used on railway locomotives and motor coaches. Gears of this type protect motors against impact shocks and vibration, lengthen life of motors, gear wheels and pinions, while reducing noise.

METROPOLITAN-VICKERS ELECTRICAL COMPANY LTD.
TRAFFORD PARK, MANCHESTER, 17. *Member of the A.E.I. group of companies*

METROVICK
Gears for all Traction Drives

K/W 102

Geared
Electric Motor Units



Any Speed reduction
Max Torque 4 lb. in.
6 in. × 3½ in. dia. ¼₀th H.P.

- **Induction Shaded Pole**
- **Series and Repulsion**
- **Variable-Speed (Rheostat)**

CITY ENGINEERING Co. (Boreham Wood) Ltd.
Manor Way - Boreham Wood - Herts.

ADHESIC AIR FILTERS

The multiple unit construction of the PREMIER ADHESIC AIR FILTER allows it to be built to any shape to fit an existing space, without loss of efficiency. Further, it eliminates the need for structural alteration or special foundation—Cleaning may be carried out without putting the filter out of action.

We shall be pleased to send you our brochure on receipt of your address.

THE
PREMIER COOLER & ENGINEERING CO. LTD.
Shalford Nr. Guildford Surrey.

A NEW and comprehensive List of **SLIDING RESISTANCES** and **DIMMERS** is now available on application

THERE HE STANDS—symbol of authority in an orderly World—controlling—directing—obeyed because absolutely trustworthy and reliable.
What a fitting comparison with BIRCH RESISTANCES, *Arms of the Ohm's Law.*
Backed by many years of practical experience in which their reliability has been tested under all conditions, BIRCH RESISTANCES, in their various applications, stand up to their job and can always be depended upon to provide specified service because of their first-class workmanship.

Birch

Registered Trade Mark

Please call upon us to help you solve any Resistance problem.

Resistances

May we quote you for any of the following:—

DIMMERS—REGULATORS (Field, Shunt, Voltage)—RESISTANCES (Arc Lamp, Charging, Regulating, Sliding)—RHEOSTATS, ELEMENTS and SPIRALS—Asbestos Woven Resistance Nets and Grids.

ARMS OF THE OHM'S LAW

H. A. BIRCH & CO. LTD., Wilohm Works, Wood Street, WILLENHALL, STAFFS
Telegrams: "WILOHM," Willenhall. Telephone: Willenhall 494-495
LONDON OFFICE: 33, SUDBURY COURT, HARROW. Telephone: ARNOLD 2694
B.R.1

Twice the life - ...no extra cost!

ATLAS

"double-life"

FLUORESCENT LAMPS

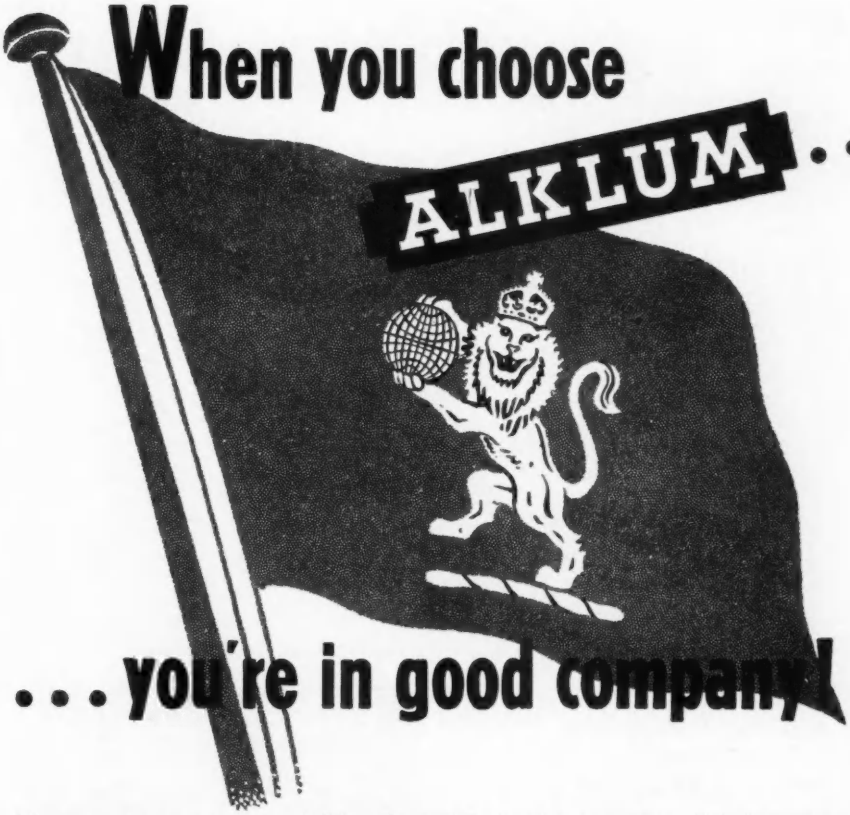
A new manufacturing technique ensures 5,000 hours of brilliant life. *Double* the average life — *same* average efficiency — and no *extra cost!* These are the facts that make Atlas "Double-life" the best and most economical of all fluorescent lamps.

Atlas "Double-life" lamps are made in all standard sizes, and in the following colour ranges: Daylight, Warm White, Northlight, Natural Daylight and Peach.

THORN ELECTRICAL INDUSTRIES

284
THORN ELECTRICAL INDUSTRIES LTD., Lighting Division, 233 Shaftesbury Ave., London, W.C.2
Telephone: Temple Bar 1599

When you choose ALKLUM . . .



. . . you're in good company!

The CUNARD LINE chose Alklum Batteries for the emergency lighting system aboard their superb ships: *Queen Elizabeth*, *Caronia*, *Media* and *Parthia*. For Alklum Batteries were the obvious choice: their all-steel welded containers and sturdy plate construction give great strength and power in a remarkably small space. Their quick recuperation after heavy discharge & their low maintenance costs make them economical and completely reliable.

ALKLUM STEEL-ALKALINE BATTERY

A97

Britannia Batteries Limited, 66 Victoria Street, London, SW1 · Telephone: Victoria 9661-2

Electrical Accessories of Quality

- SWITCHES
- LAMPHOLDERS
- CEILING ROSES, ETC.

LONDON OFFICE
21 Great Suffolk Street, S.E.1

SPERRYN & CO
MOORSOM STREET WORKS
BIRMINGHAM 6

LEGG TWO RATE
SUB STATION CONTROL
SWITCH TRIPPING
RECTIFYING EQUIPMENT

Designed for use with 200-cell Nickel Cadmium Battery 140 ampere hours, operating switch tripping and closing gear.

Quick charge rate of 17 amps. adjustable between 253/340 volts, and supplying floating load of 3 amps. at 230/240 volts.

On load battery test circuit is incorporated.

Legg Industries design and manufacture Rectifying and Battery Charging Equipment for all purposes where metal rectification can be employed.

Legg SWITCH TRIPPING RECTIFYING EQUIPMENT

LEGG (INDUSTRIES) LTD.,
WILLIAMSON STREET, WOLVERHAMPTON

5724B

By courtesy of E. F. Pressey, Esq., F.R.I.C.S., Engineer and Surveyor, Borough of Wokingham.

Eleco Planned Lighting

makes roads safer at night

One picture can convey as much as a hundred words. Look therefore at this reproduction from an un-retouched photograph of the ELECO installation on the Reading-Ascot Road (A.329) at Wokingham, Berkshire. *Observe, too, how planned lighting enhances the beauty of the countryside at night.*

Technical Data

Road width 30 ft. Illumination by ELECO "Golden Ray" 140 watt lanterns, at 150 ft. intervals and 25 ft. above roadway, on Concrete Columns.

Engineering and Lighting Equipment Co. Ltd.

SPHERE WORKS, ST. ALBANS, HERTS

Telegrams: VOLTARCON, ST. ALBANS Telephone: ST. ALBANS 2258/2259

ELECO

It's the

perfect

cleaner

. . . and rightly so !

It's light in weight, light on the furnishings and light on the purse, but heavy on dust and dirt. And almost every testimonial speaks glowingly of the 10 years, 15 years, 20 years, of dependable service. Every home needs an electric cleaner and more people than ever choose Hotpoint, although it entails waiting a while for delivery.

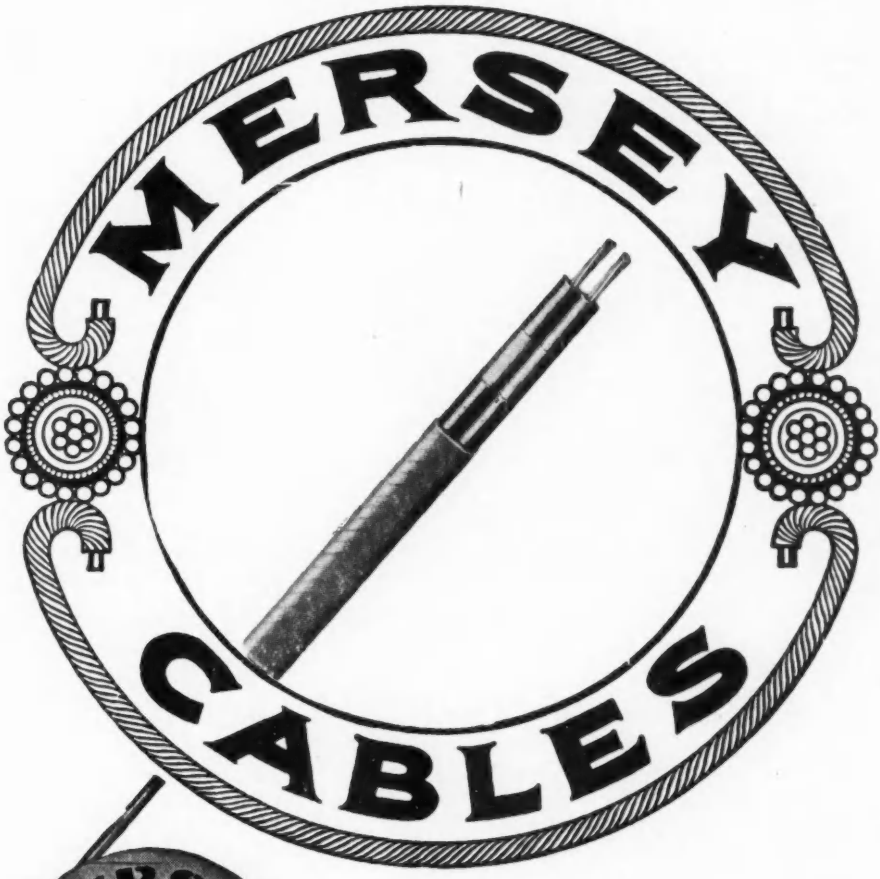
STOCK
SHOW
SELL

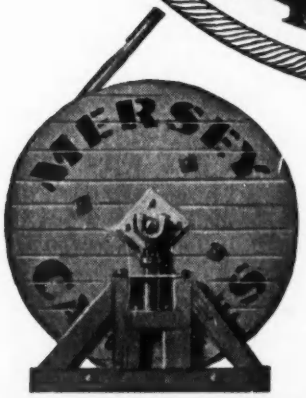
Hotpoint

domestic appliances

THE HOTPOINT ELECTRIC APPLIANCE COMPANY LTD., PETERBOROUGH

Member of A.E.I. Group of Companies





All Sizes of rubber insulated wires, cables and flexibles are made under the famous MERSEY name. *Illustrated is a* 3/.036 *Flat Twin V.I.R Insulated, Taped, Varnished Cambric Lapped, Braided and Red Lead Weather resisting Compounded H.S.O.S. Cable* 250 *volt Grade. To B.S.—No.* 7/1946.

MERSEY CABLE WORKS LTD., BOOTLE, LIVERPOOL. *Tel. BOOTLE 4111 (4 lines)*

A COMPANY

Your breakdown is our business...

We can get those idle machines going again with the minimum delay and, what is just as important, we can keep them going. Thirty years experience as a sort of Industrial Tweeny, specialising in mechanical and electrical repairs to all kinds of manufacturing equipment, in all parts of the country, are a guarantee that we can handle your particular problem with the maximum speed and efficiency.

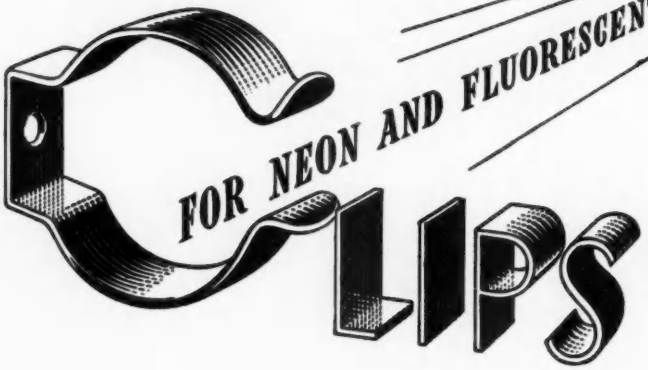
There is another side to our business; we make as well as mend. We revel in problem jobs that production engineers cannot find the time to tackle but which just 'have to be done'. Within the scope of our business we can design, make, test, repair and guarantee any kind of electrical and engineering equipment for anybody. If you have any problem that comes under the heading of making or mending, get in touch with the Industrial Tweeny. We will arrange transport.

NOTE: As we are 'one off' specialists we do not issue a catalogue, but if you are interested and will let us know, we will forward a copy of a booklet describing our activities.

Browning's Electric Co. Ltd.

SPECIALISED ELECTRICAL & MECHANICAL ENGINEERING SERVICE

BOLEYN CASTLE, GREEN STREET, UPTON PARK, LONDON, E.13.
Tel. GRAngewood 4033 (3 lines)



hosphor bronze neon clips, self-finish or nickel-plated, from 9 mm to 22 mm. Spring steel fluorescent clips, nickel-plated ½ in. to 1½ in.

Estab. 1919
A.I.D. Approved

THE LEWIS SPRING CO. LTD.
Resilient Works, Redditch
Telephone: Redditch 720/1/2

London Office: **322 High Holborn, W.C.1**
Telephone: HOLborn 7479 and 7470

LEAVE IT TO **Lewis** *OF REDDITCH*

S.P. Transformer Bushings

A recent addition to the range – **TYPE A-4.** working voltage 600-1,000 volts current ratings 150, 350 and 500 amps.

The S.P. range includes bushings for all voltages up to 88kV and current ratings up to 1500 amps. Write for Catalogue No. 21.

STEATITE & PORCELAIN PRODUCTS LIMITED

Stourport on Severn, Worcestershire. Phone: Stourport 111. Grams: Steatain, Stourport.

SP. 46

Have you had your copies?

Here are two recent publications which fully described the latest range of Revo Electric Fans and Switchgear

(*Right*) Publication No. 757, dealing with desk and ceiling fans, types for ships, and exhaust fans

(*Above*) A selection of Revo switch and fuse gear suitable for house service and industrial applications.

REVO ELECTRIC CO. LTD., TIPTON, STAFFS.

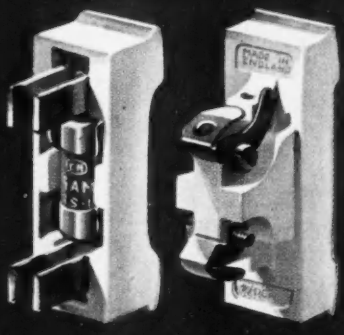
NEW

right through

FOR SINGLE

POLE AND

NEUTRAL DUTY



MEMSPEL & MEMSPAN

MEMSPEL and MEMSPAN are the steel-clad and all-insulated versions of an entirely new range of switch-fuse gear designed by MEM for single pole and neutral installations. All the skill of MEM's design team has gone into this job. Outstanding features are extreme compactness and simplicity of wiring—slow break A.C. switch, choice of BS1361 cartridge or rewirable fuses with interchangeable holders, and effective interlocking. Available in steel-clad and all-insulated units for 15, 30 and 60 amps including 2, 3 and 4 way splitters.

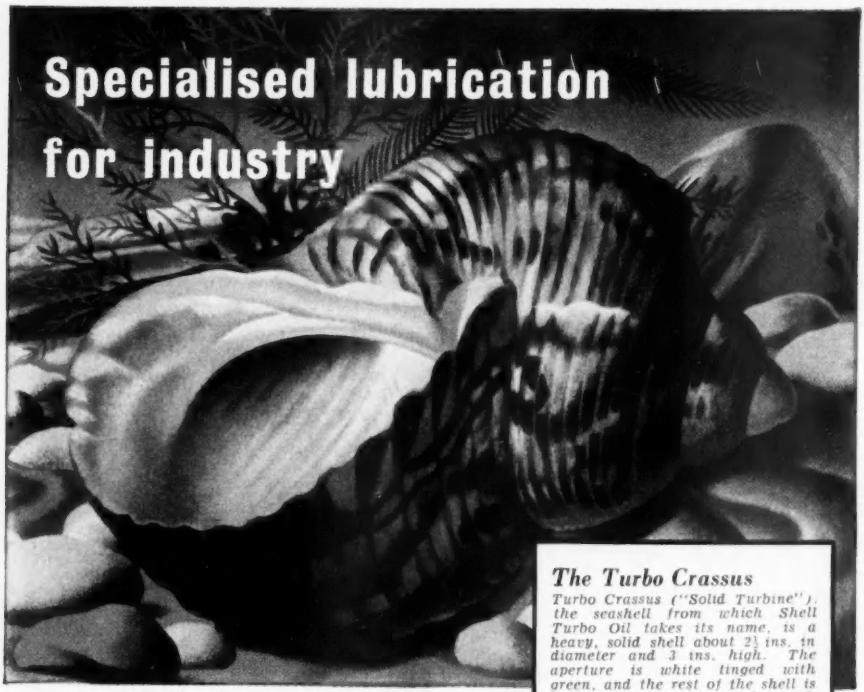
You will be delighted with the excellent design and fine workmanship, particularly when you check the attractive prices.

MEM

Send for new Switchcraft catalogue (List No. 311) and full details of the new range.

MIDLAND ELECTRIC MANUFACTURING CO. LTD., TYSELEY, BIRMINGHAM 11

Branches in London & Manchester



The Turbo Crassus

Turbo Crassus ("Solid Turbine"), the seashell from which Shell Turbo Oil takes its name, is a heavy, solid shell about 2½ ins. in diameter and 3 ins. high. The aperture is white tinged with green, and the rest of the shell is dirty white or greenish, with angular black or brown patches on the ribs. Found off the coasts of North Australia and New Caledonia.

SHELL TURBO OIL

SHELL TURBO OILS are highly refined oils containing anti-oxidant and anti-rust additives. They separate readily from water during prolonged service and have outstanding oxidation stability. Available in a range of viscosities, they are recommended for steam, gas and water turbines, bearings of high speed enclosed crankcase steam engines, and certain other circulating systems where oils of turbine quality are required. Shell Turbo Oils are approved by all the leading turbine builders.

The wide Seashell range of specialised industrial lubricants is marketed in nearly every country of the world. There is a Seashell grade for *every* industrial use—and each is available everywhere in the same high quality.

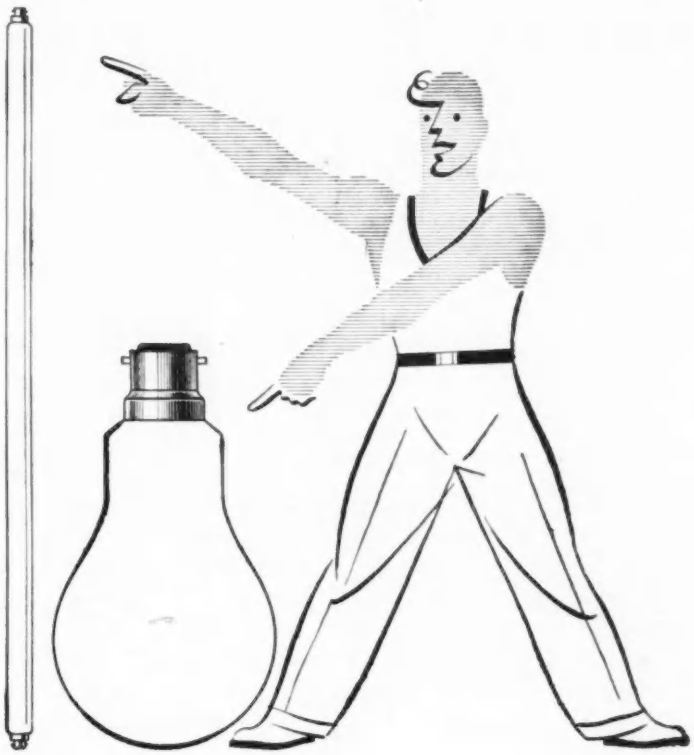
SHELL **LEADERSHIP IN LUBRICATION**

WORLD-WIDE INDUSTRIAL RESEARCH

Seashell Oils are produced as the result of *world-wide research*. At Shell's great Thornton Research Centre, and at other Shell Research Centres in Europe and America, scientists and technicians spend their lives studying the special lubrication needs of every branch of industry. The rewards of this research are the Seashell oils—each developed to solve a *specialised* lubrication problem. This is the solid basis upon which Shell has built up its world-wide *leadership in lubrication*.

CALL IN A SHELL LUBRICATION ENGINEER

Shell Lubrication Engineers will be pleased to provide further information and to make specific recommendations for particular purposes. You can be sure of Shell lubrication—it is *specialised* lubrication.



Tone up your sales by stocking

Many a production problem can be helped by putting the right lamp in the right place. Elasta Lamps have served industry and public services with outstanding efficiency for over forty years.

TUNGSTEN FILAMENT AND FLUORESCENT

Elasta
LAMPS
AN E.L.M.A. BRAND

POPE'S ELECTRIC LAMP CO. LTD. *Head Office:* 5 Earnshaw St., New Oxford St., London, W.C.2.
BRANCHES: MANCHESTER · LEEDS · LEICESTER · BIRMINGHAM · BRISTOL · BELFAST (NORTHERN IRELAND)

C

WE HAVE PLEASURE IN ANNOUNCING

THAT FOLLOWING REORGANISATION FOR GREATLY INCREASED PRODUCTION WE ARE ABLE TO SUPPLY

GILFLEX CONDUITS AND ACCESSORIES FROM STOCK

●

WRITE, 'PHONE OR CALL FOR DETAILS AND PRICES:

GILFLEX CONDUITS LTD.

41 THE PARADE, HIGH STREET

WATFORD, HERTS

'PHONE WATFORD 3422

FOR THOSE CONCERNED WITH DEFENCE CONTRACTS

AN UNRIVALLED SERVICE FOR THE SOLUTION OF ANY MOULDING PROBLEM

Many industries are faced with revised programmes brought about by the demands of recent defence measures. For contracts requiring the supply of high quality, high precision injection or compression mouldings, Ekco Plastics, suppliers to the Admiralty and Ministry of Supply, are ready for immediate action.

Ekco Plastics also relieve you of the responsibilities of Government test and inspection; their inspection staff are officially approved by A.I.D, Admiralty and all other Government Departments.

CONSULT* EKCO *PLASTICS

Members of the British Plastics Federation and the Society of the Plastics Industries of America.

E · K · COLE LTD. (*Plastics Division*)
SOUTHEND-ON-SEA

Tucker 5 AND 15 AMP.

"NOLOK"

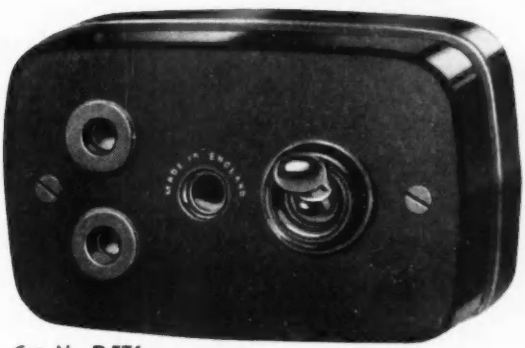
SWITCHED SOCKET-OUTLETS

3-Pin (2 Pole and Earth) ROUND PIN TYPE

These attractive units provide efficient convenience outlets for portable appliances.

Safety shutters and porcelain insulation are two features which indicate the sound principles of design. The 5 amp. pattern incorporates the well-known TUCKER B4000 type Q.M.B. Single Pole Switch mechanism with COMPLETE Positive Action. In the 15 amp. range Single and Double Pole A.C. Switch mechanisms, the conical shaped contact members seat independently under robust compression spring pressure to provide an exceptionally smooth switch action.

Cat. No. **P.136**



Cat. No. **P.576**

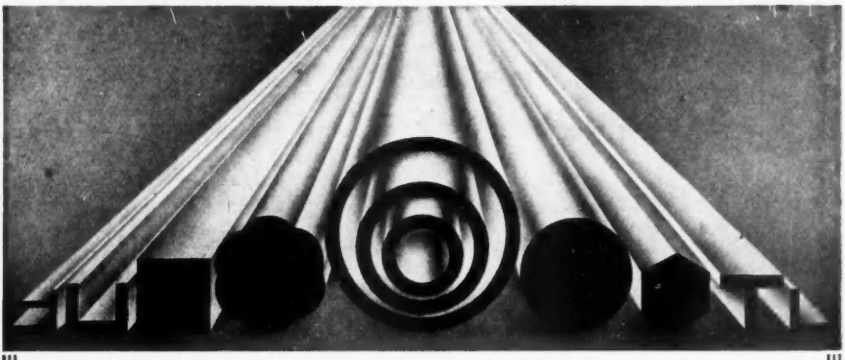
Tucker TELAC

J. H. TUCKER & CO., LTD., Kings Road, Tyseley, Birmingham 11

***London Office:* 2 Newman Street, W.1**

Makers of First-Grade Electrical Accessories since 1892

Agents in Baghdad: The Faiha Trading Corporation, Ltd., 30/32 Rewaq Street (P.O. Box No. 52), BAGHDAD



Wrought Bronzes

for all industries

IMMADIUM HIGH TENSILE BRONZES. MADE IN FOUR GRADES WITH TENSILE STRENGTHS FROM 30 UP TO 50 TONS PER SQUARE INCH.

CROTORITE ALUMINIUM BRONZES. 30 TO 50 TONS ULTIMATE STRENGTH. A RANGE OF CORROSION-RESISTING ALLOYS WHICH RETAIN GOOD STRENGTH AT HIGH TEMPERATURES.

PARSONS MANGANESE BRONZE. THE ORIGINAL MANGANESE BRONZE ALLOY.

* Brass, Naval Brass, Yellow Metal, Brazing Metal and other Alloys supplied to British Standard, American and other specifications.
* Extruded Rods, Bars, Tubes and Sections. Rolled Rods, Bars, Tubes, Plates and Sheets, Forgings and Machined Parts.

BROCHURES SENT FREE ON REQUEST

THE MANGANESE BRONZE & BRASS CO. LTD.
HANDFORD WORKS, IPSWICH, SUFFOLK

Telegrams: Bronze, Ipswich **Telephone: Ipswich 2127**

HOLOPHANE FLAMEPROOF FITTINGS

(BUXTON CERTIFIED)

Efficient Performance with Operational Safety

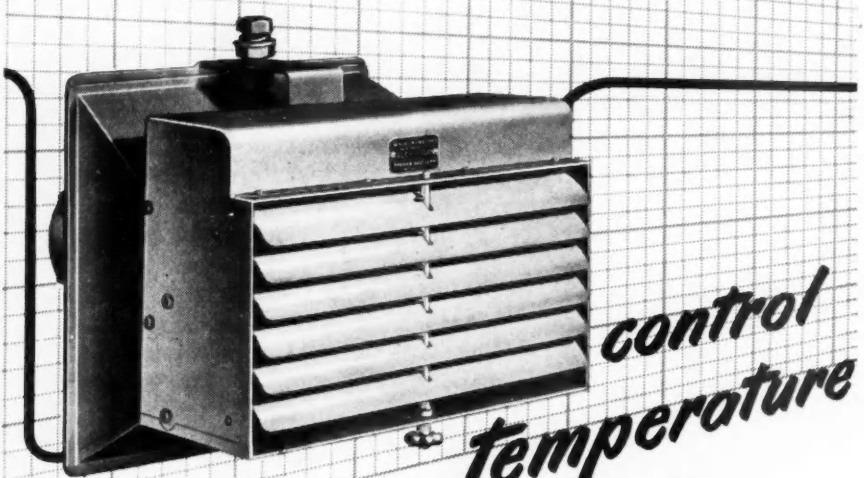
Holophane (Buxton certified) Flameproof Units for use in Class B Industrial Type Installations are robustly constructed in cast silicon aluminium alloy and embody an efficient prismatic optical system.

HOLOPHANE LTD

SCIENTIFIC LIGHTING ENGINEERS

ELVERTON STREET, LONDON SW1

For maximum production—



control temperature

with

A G.E.C. electric unit heater installation is the modern way of maintaining the constant temperature necessary for maximum production.

G.E.C. Electric Unit Heaters are easy to install. They operate at low cost, require negligible maintenance, and permit close temperature control.

Units are available for every need.

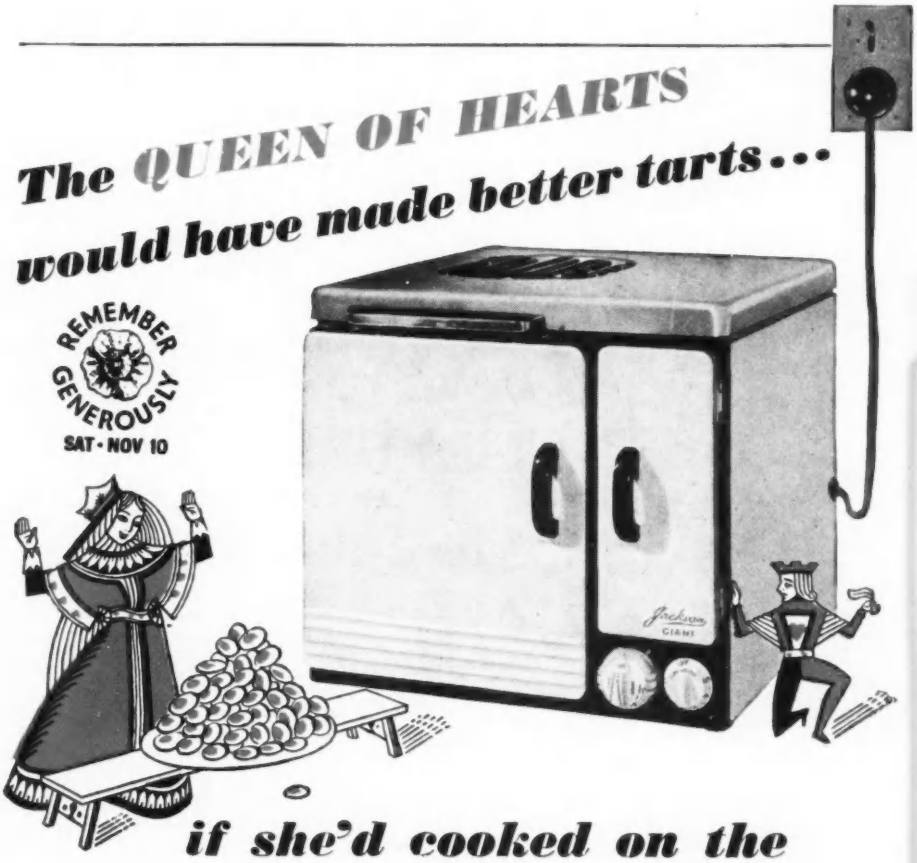
Write for publication H.5.

G.E.C.

ELECTRIC UNIT HEATERS

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2.

The QUEEN OF HEARTS would have made better tarts...



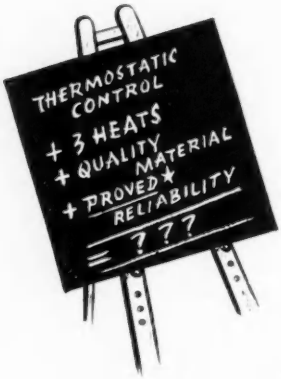
if she'd cooked on the 'GIANT' that Jackson built

Made for the smaller families . . . smaller flats . . . but for full-sized meals. Every modern feature will be found in the famous JACKSON 'GIANT'. Self-contained oven with thermostat control. Independent Radiant Plate with 'Simmerstat' control. Efficient grill. Large hot cupboard. No special wiring or control panel required. A marvel of electric cooker construction.

The specially designed stand for the Giant Cooker can be supplied with one or two cream vitreous enamel shelves, which are interchangeable. They may be used as a saucepan shelf and as a hob cover.

And it can be connected to a power point (13 amp.)

THE JACKSON ELECTRIC STOVE COMPANY LTD
143 SLOANE STREET, LONDON, S.W.1. PHONE SLOane 6248



There's only one answer

OF COURSE IT'S

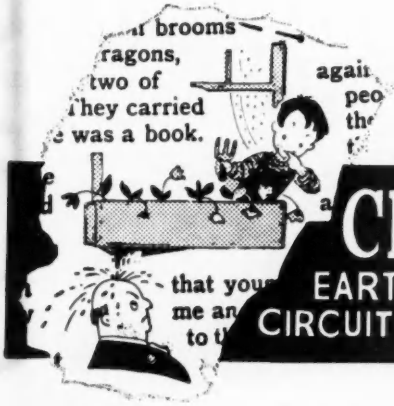
A

PERMAHEAT

ELECTRIC BLANKET

From RETAILERS, STORES, BOOTS THE CHEMISTS etc. etc.

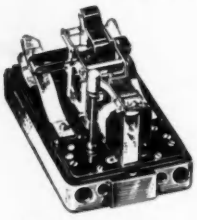
PERMAHEAT LTD. SPECTATOR STREET, MANCHESTER, 4



Have you an Earth Leakage Problem?

CHILTON EARTH LEAKAGE CIRCUIT BREAKERS

Offer you positive protection for 33/- TYPE ELT'A'



(Without the cover)

Other Models:
ELT/B with thermal and magnetic overload trip up to 30 amps - £2 7 6
ELT/B with thermal and magnetic overload trip over 30 amps - £2 17 6

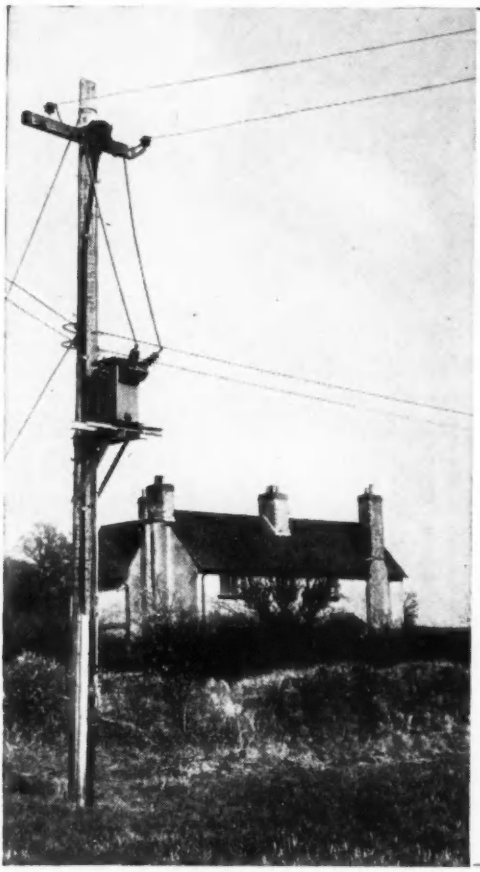
FEATURES

Capacity: 0 to 60 amps - Double Pole
Robust Construction - Easily Installed
Corrosion Free - Free Handle

Full information—with pleasure—from:

CHILTON ELECTRIC PRODUCTS LTD. (Dept. E.T.1)
HUNGERFORD - BERKS - ENGLAND

'ENGLISH ELECTRIC'
transformers



Rural Electrification

'ENGLISH ELECTRIC' standard distribution transformers continue to make a major contribution to the effort to bring electricity to the greatest possible number of farms and homes, not only in Britain but in many countries overseas.

Years of experience and progressive research have kept 'ENGLISH ELECTRIC' in the forefront of transformer development — from the smallest transformers for electronic devices to the largest power transformers for the highest voltages.

Details of the complete range of standard distribution transformers will be supplied on application to Transformer Sales & Contracts Department, The ENGLISH ELECTRIC Company Ltd., East Lancashire Road, Liverpool, 10.

The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2
Transformer Dept., Liverpool

Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

TDIS.1

The oven thermostat

WITH FLEXIBLE DRIVE

Some just happen; this one was designed . . . . designed to cut out the snags . . . designed for minimum maintenance . . . . designed (note the flexible drive) for easy fitting . . . . designed — and made — by people who know.

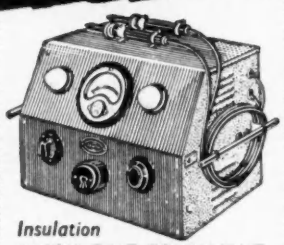
SUNVIC

Domestic temperature controls

SUNVIC CONTROLS LTD. SUNVIC HOUSE, ESSEX STREET, STRAND, LONDON, W.C.2
Member of the A.E.I. Group of Companies

TAS/SC. 264

Flash Testing up-to-date

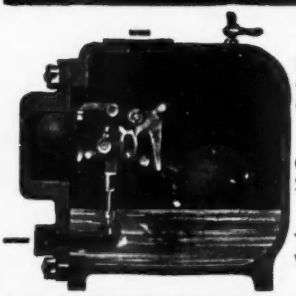


Insulation
FLASH TEST EQUIPMENT
with "VARIAC" Control
Booklet on request

It's a ZENITH *product!*

The ZENITH ELECTRIC Co. Ltd.
Sole Makers of the well-known "Zenith" Electrical Products
Zenith Works, Villiers Road, Willesden Green, London, N.W.2
Phone: Willesden 4087 *Grams:* Voltaohm, Norphone, London

"THE BRADFORD"
STEAM TRAP



Positive and Instantaneous Opening and Closing.

. . .

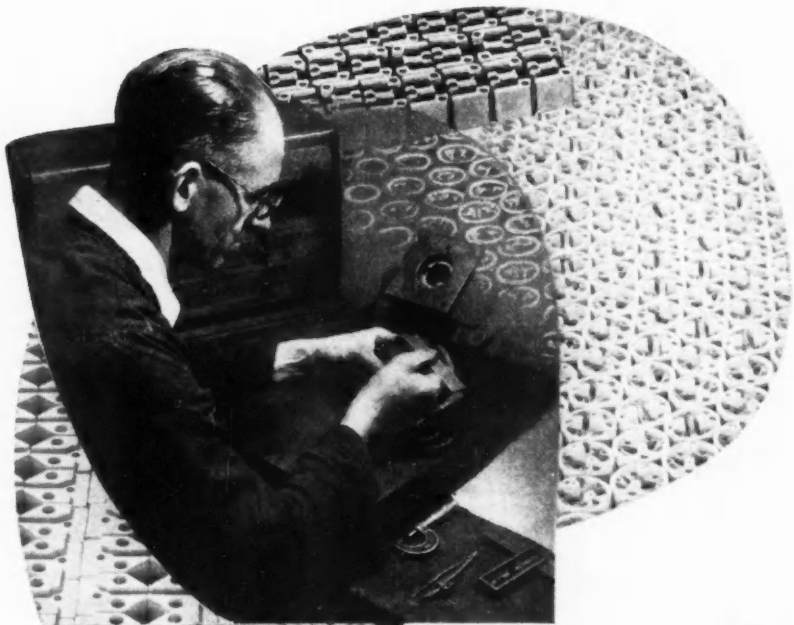
Outlet Always Sealed.

. . .

Thousands Working.

UNITED STATES METALLIC PACKING CO. LTD.
SOHO WORKS · BRADFORD

Branch Offices: LONDON, LIVERPOOL, GLASGOW BOLTON, NEWCASTLE, CARDIFF, SOUTHAMPTON



The Impress of Quality

The neathanded, fine fingered skill of the toolmakers, insculptures steel to form intricate dies. Male and female, producing in prolific quantity the myriad porcelains that have become routine necessities to the electrical requirements of this modern age.

Fine porcelains, bearing in their precise repetition that impress of Quality, by which all Taylor Tunnicliff products are universally recognised.

Taylor Tunnicliff & Co Ltd.

Die Made Porcelains

Head Office: EASTWOOD · HANLEY · STAFFS.

Telephone: Stoke-on-Trent 5272-4

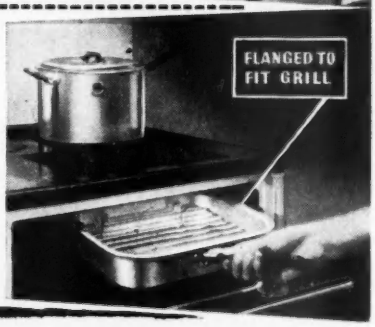
London Office: 125 HIGH HOLBORN W.C.1. *Telephone: HOLborn 1951/2*

DUAL PURPOSE GRILL FRYPAN

The new Pyramid dual purpose grill-frypan fits any standard post-war grill. With wire grid it is an efficient and enduring grill pan—while the Pyramid special construction gives it a ¼ in. thick base, guaranteed against distortion and making it an admirable frypan. Thus, one pan does the work of two.

This is the first pan specially designed to meet the needs of those good cooks who first grill and then fry in order to economise in both fat and time.

The grill-frypan has wide corners for easy cleaning and is fitted with the special PYRAMID heat-resisting and insulated Bakelite handle.



PYRAMID
ALUMINIUM WARE
for ELECTRIC COOKING
HAGUE & McKENZIE LTD
PYRAMID WORKS, BIRMINGHAM 1

½ h.p. up to 27 h.p. Output Speed Range 6 r.p.m. to 556 r.p.m.

Please apply for our complete range of GEARED MOTORS & SPEED REDUCERS

Electropower
KINGSBURY WORKS
KINGSBURY ROAD
LONDON . N.W.9
Gears ltd

Tel.: COLindale 4621 (3 lines)
'Grams, Cables: Lektropowa, Hyde, London

The Answer to a multitude of Problems...

Secomak 'STATAIR' UNITS
FOR HIGH VELOCITY SUCTION & BLOWING

High velocity blowing and suction problems are minimised with these lightweight, compact units. They give static pressures up to 33 in. w.g. and free air is delivered at volumes up to 140 c.f.m. "Statair" units are adaptable, economical and will run in any desired position. They can be connected up in a few minutes. Write for Leaflet No. 104/37-ET.

1. Supplying air for oil, fuel and gas furnaces.
2. Forge blowing, gas blow pipes, etc.
3. Swarf collection off machinery, e.g. textiles, plastics, paper, chemicals, etc.
4. Fume extraction and tank drying.
5. Dust collection from polishing heads and grinders.
6. Radio and rectifier valve cooling.
7. Ventilation of confined spaces.

These typical uses by no means exhaust the almost limitless possibilities of these versatile and adaptable units

SERVICE ELECTRIC CO., LTD.
SECOMAK WKS., HONEYPOT LANE, STANMORE, MIDDX. Tele EDGware 8631-2-3-4
S.IQ

Freedom from tracking is the outstanding characteristic of mouldings made from Scarab. Scarab moulding powder is inexpensive, easy to mould and is made in black, brown and a wide range of attractive colours. There is a special plasticised grade with low after-shrinkage for moulding around heavy inserts. Write for technical leaflets. Standard Scarab moulding powder conforms to BS. 1322, Type U.

B·I·P GROUP

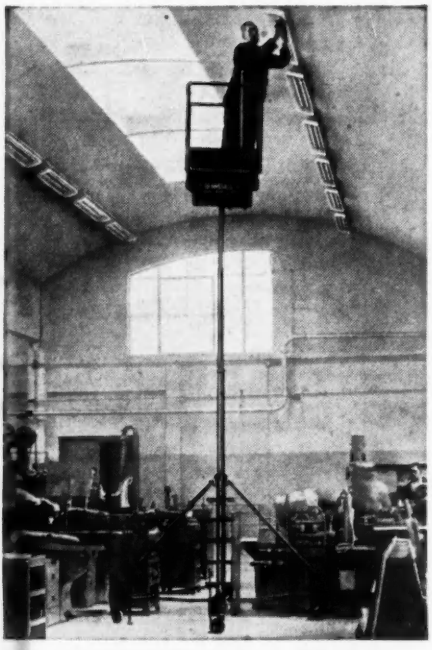
Distributed by :

THE BEETLE PRODUCTS COMPANY LIMITED

1 Argyll Street, London, W.1

* * * * * * * *

Scarab *is a trade mark registered in Great Britain and in most countries of the world.*



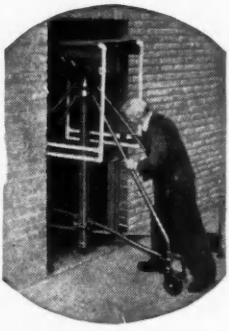
CUT YOUR MAINTENANCE COSTS

with the famous

BEANSTALK

Regd.

Maintenance of plant and buildings is safer and quicker—makes previously difficult places now easily accessible. Standard model provides the operator with a working height of 23-25 feet yet when retracted the BEANSTALK can be pushed through an ordinary small door. Alternative BEANSTALKS now available: 30 foot working height model, trailer type, junior model with 18 foot working height, and model with umbrella framework for conveying in small lifts. All models can be power operated if required. **We will gladly demonstrate this equipment at your works by appointment.**

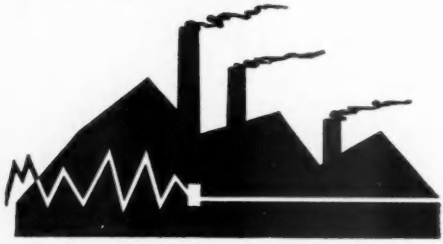


Write for full illustrated particulars to:

WM. MOSS & SONS Ltd.

(Mechanical Developments Division),
North Circular Road,
Cricklewood, N.W.2.
Tel. GLAdstone 8080

B.P.T. POTENTIALITIES N°. 3



Steady Production NEEDS STEADY VOLTAGE

B.P.T. Automatic Voltage Regulators will maintain a constant voltage unaffected by variation in supply voltage, frequency, load and load power factor, with no wave distortion.

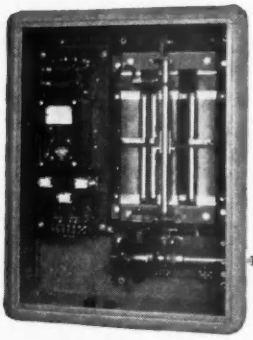
Range of Standard Models includes

SINGLE PHASE, wall mounting type, air cooled—four models from 12½ amps to 70 amps. Floor mounting cubicle type, air cooled: 1 model, 90 amps. Floor mounting type, oil cooled: six models, 60 amps to 240 amps.

THREE PHASE, wall mounting type, air cooled: three models from 7½ amps to 12 amps. Floor mounting cubicle type, air cooled: four models, 30 amps to 100 amps. Floor mounting type, oil cooled: six models from 45 amps to 150 amps.

May we send you further information?

Please write for leaflet No. BP 404/3.



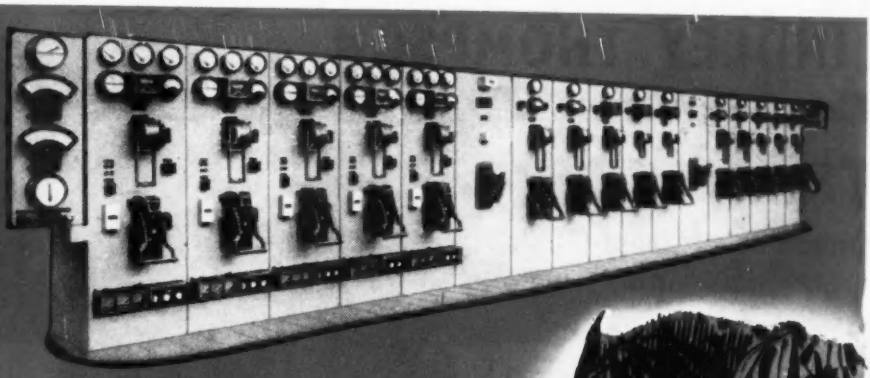
Automatic Voltage Regulator, three phase, air cooled, wall type. Input 440v ± 10% output 440v ± 1%, 7½ amps.

BRITISH POWER TRANSFORMER CO. LTD.

QUEENSWAY • PONDERS END • MIDDLESEX

Telephone: HOWard 1492 Telegrams: "Vitrohm, Enfield"

B.P.4041-CV



"Erskine Heap"
SWITCHGEAR
for
a War Dept. Power Station

OVERSEAS...

This main low tension switchboard is an overseas installation . . . the rear view shows extremely robust construction; and all the circuit breakers are of the 25 M.V.A. A.S.T.A. tested rupturing capacity to BSS 116, 1937; the isolating switches being of the back of board type with front operation.
On the same station, a large amount of 11 K.V. switchgear and 400 volt distribution switchgear was also supplied.
On left is REAR VIEW of switchboard showing dividing panels removed.

SWITCHGEAR :
50 amps. up to 5,000 amps.
MOTOR CONTROL GEAR: ¼ h.p. up to 5,000 h.p.

May we have your enquiries?

It's the Switchgear engineers like to 'LIVE' WITH.

ERSKINE, HEAP & Co LTD
SWITCHGEAR SPECIALISTS
Head Office and Works
BROUGHTON, MANCHESTER (7)
BRANCH OFFICES AND AGENCIES
London Office
GRAND BUILDINGS, TRAFALGAR SQ., W.C.2
IN ALL PARTS OF THE WORLD

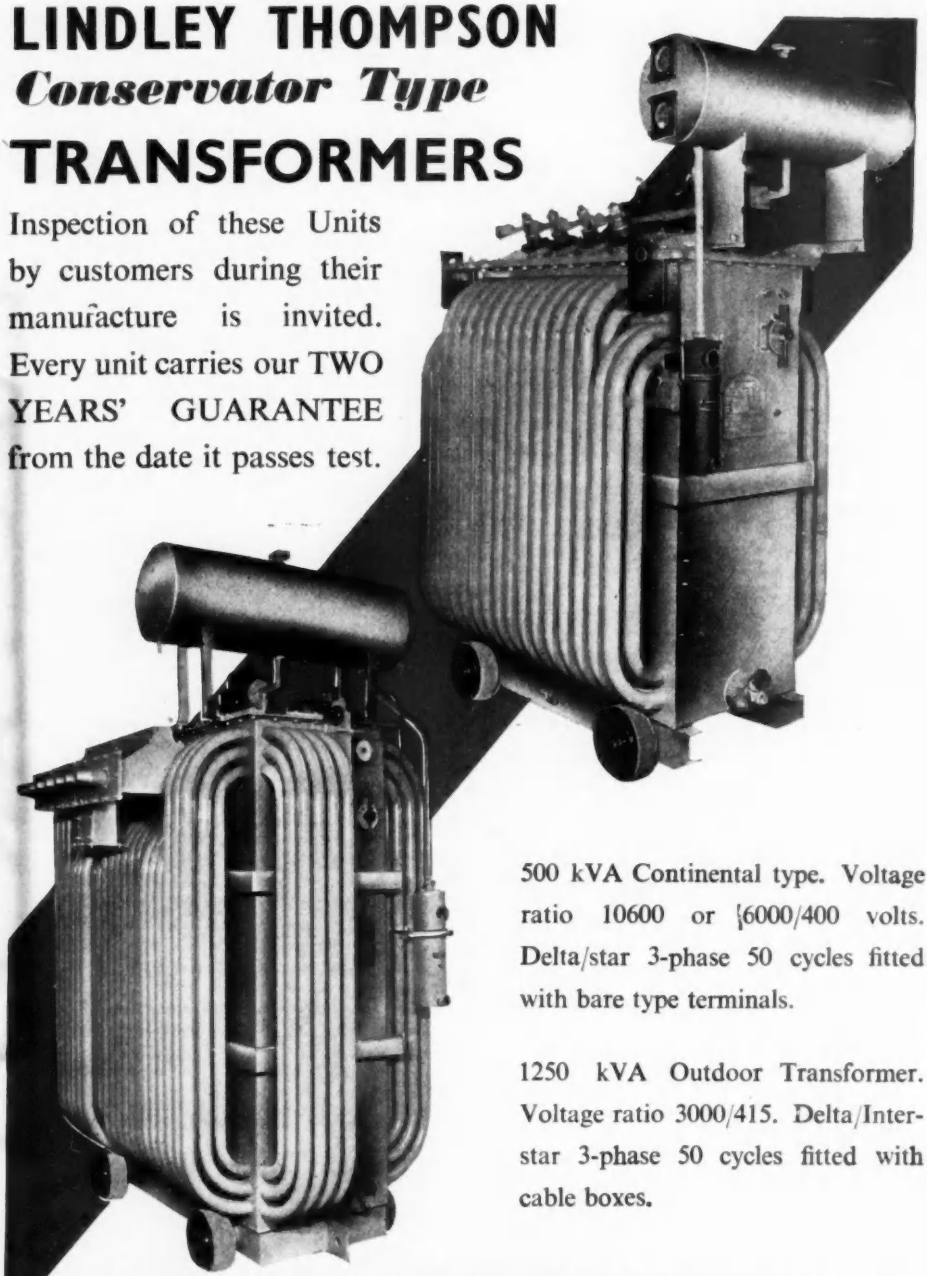
640

LINDLEY THOMPSON

Conservator Type

TRANSFORMERS

Inspection of these Units by customers during their manufacture is invited. Every unit carries our TWO YEARS' GUARANTEE from the date it passes test.



500 kVA Continental type. Voltage ratio 10600 or 6000/400 volts. Delta/star 3-phase 50 cycles fitted with bare type terminals.

1250 kVA Outdoor Transformer. Voltage ratio 3000/415. Delta/Inter-star 3-phase 50 cycles fitted with cable boxes.

THE LINDLEY THOMPSON TRANSFORMER & SERVICE CO., LTD.

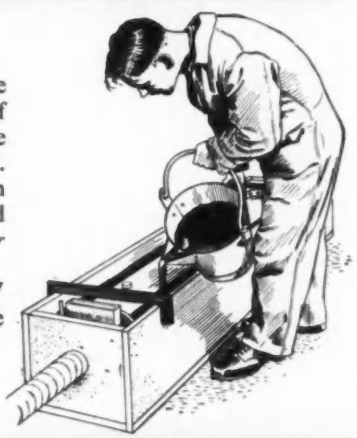
ST. MARY'S ROAD . MIDDLE GREEN . SLOUGH . BUCKS

It's the compound that matters . . .

and BICC make the right compound

Choose the right compound—that's the first essential—and you have the makings of a perfect joint; and for every type of cable joint, BICC can supply the right compound. For nearly seventy years we have been developing a wide range of carefully blended compounds, for our own use—and for *your* use too.

Let us send you Publication No.257**W** giving full technical information on the range of BICC Joint Box Compounds.

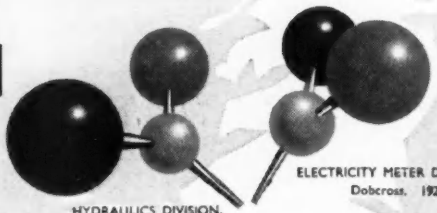


B.I. Callender's JOINT BOX COMPOUNDS

BRITISH INSULATED CALLENDER'S CABLES LIMITED
NORFOLK HOUSE, NORFOLK STREET, LONDON, W.C.2

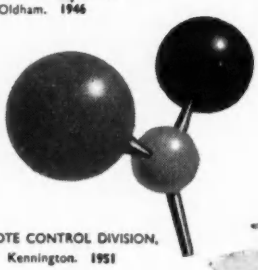
the Boffins may call it

BINARY FISSION



ELECTRICITY METER DIVISION, Dobcross. 1926

HYDRAULICS DIVISION, Oldham. 1946



REMOTE CONTROL DIVISION, Kennington. 1951

—whatever you call it

it's GROWTH by DIVISION *like*

MEASUREMENT Ltd

ELECTRICITY METER DIVISION Tameside Works, Dobcross, Lancs. Tel. No. Delph 291

HYDRAULICS DIVISION 119 Union Street, Oldham, Lancs. Tel. No. Manchester Main 6432/4

REMOTE CONTROL DIVISION, Fitzalan St. Works, Kennington Road, London, S.E.11. Tel. No. Reliance 2406

A Company of the Parkinson & Cowan Group

12

REASONS WHY
YOU SHOULD USE
Aluminium
ALLOY CASTINGS

LO

higher pay load

renfrew foundries ltd

A word about deeds

"DEEDS, NOT WORDS" is a good motto for business. Yet some words have great power to influence deeds.

The name of Laing stands for many fine structures—power stations, factories, steelworks, cement works, aerodromes and schools—completed efficiently and on time, and for a century-old tradition of team work and craftsmanship. The name sets a standard which the firm's employees are ambitious to live up to; and so it is a great begetter of deeds.

Furthermore it guarantees that same high standard of work for those who entrust their construction to John Laing and Son Limited.

LAING

For speed and efficiency in building and civil engineering

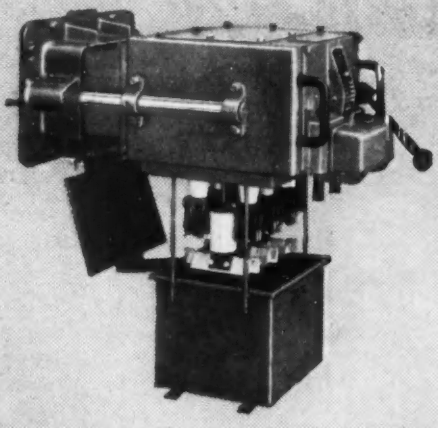
JOHN LAING AND SON LIMITED · *Established in 1848*

London, Carlisle, Johannesburg, Lusaka

Type HM

L.V. OIL BREAK
HORIZONTAL DRAW-OUT

First-class design, materials, manufacture and finish all contribute to the renown which this range of Switchgear has won over a period of years

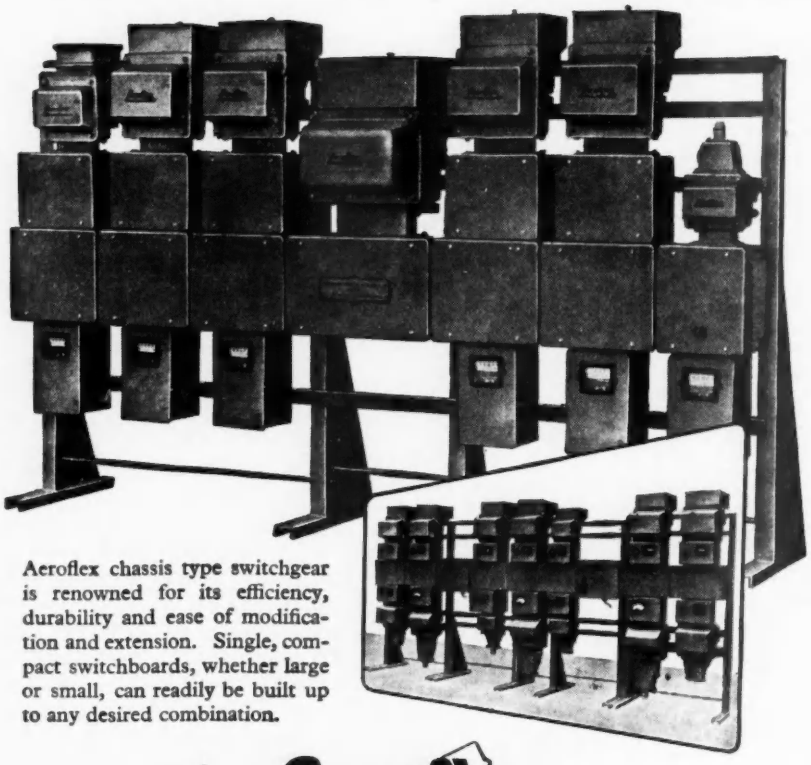


INDUSTRIAL SWITCHGEAR

J. G. STATTER & CO. LTD.
82 VICTORIA STREET, LONDON, S.W.1

JGS14/1

Unit Type SWITCHBOARDS



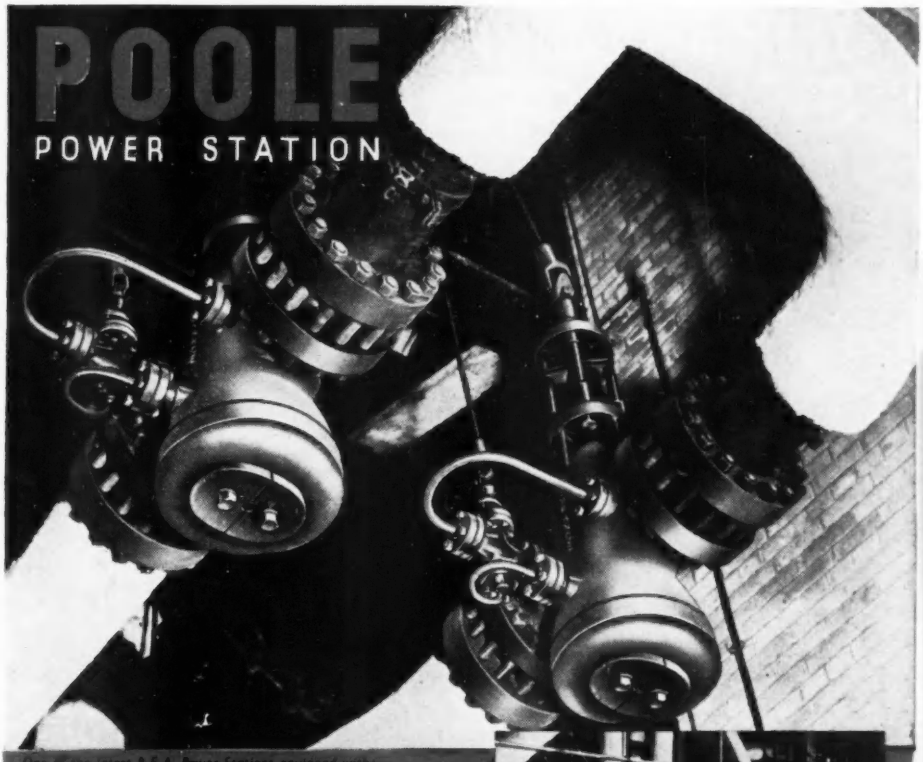
Aeroflex chassis type switchgear is renowned for its efficiency, durability and ease of modification and extension. Single, compact switchboards, whether large or small, can readily be built up to any desired combination.

with Aeroflex HOPE'S PATENTS

HIGH BREAKING CAPACITY REWIREABLE CARTRIDGE FUSES

PARMITER, HOPE & SUGDEN LIMITED
FLUVENT Electrical Works, Longsight, MANCHESTER 12
London: 34 Victoria St., S.W.1. Glasgow: 162 Buchanan St., C.1

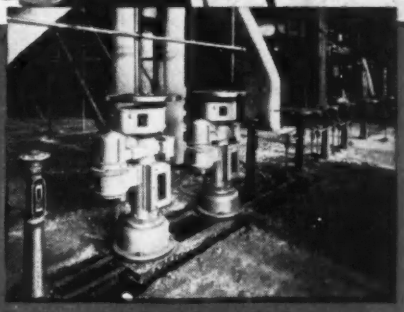
dm PH 22



One of the latest B.E.A. Power Stations equipped with:—

DEWRANCE VALVES

FOR
HIGH PRESSURE STEAM
900 lb/sq inch 925°F
& FEED SERVICES
1430 lb/sq inch



The Valves of the 7", 8", 10" and 12" sizes are of our latest design with internal pressure held covers. This feature eliminates conventional heavy cover flanges and bolting and permits the withdrawal of internal components for inspection without dismantling the top gear. The seat faces are formed by depositing a heat and wear resisting alloy direct to the body, thus eliminating leakage under the seats.

A large number of the Feed Valves are electrically operated with control columns situated above the Valves.

The photographs reproduced above show two of the 8" Feed Valves with extended spindles and floor columns mounted with electrically operated valve equipment.

By courtesy of the Controller, Southern Division, B.E.A.

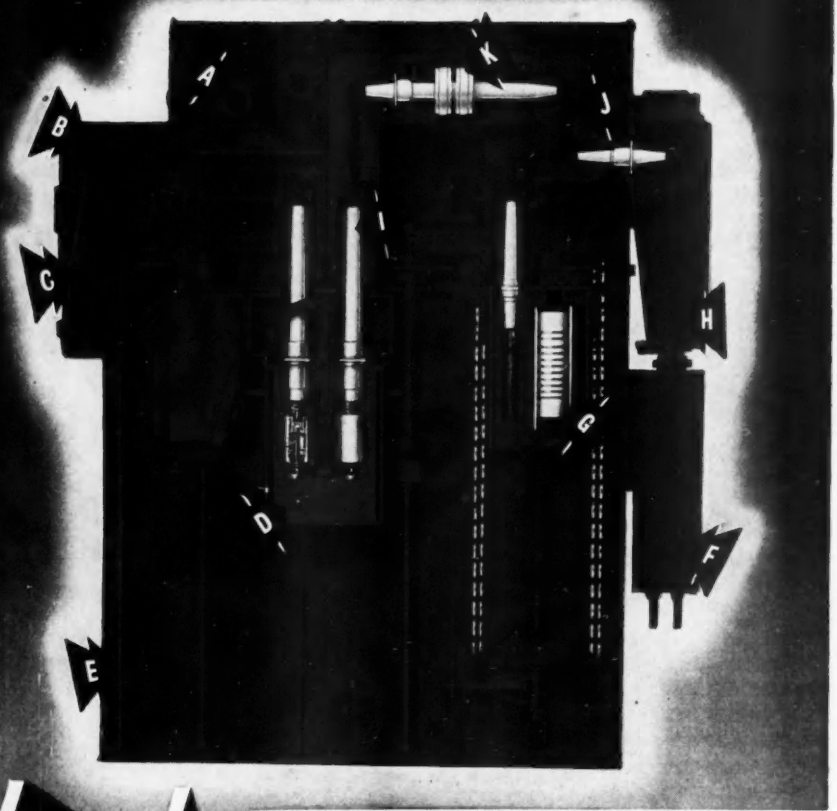
DEWRANCE & Co LTD

GREAT DOVER ST., LONDON, S.E.1

Telephone: HOP 1244 (10 Lines)

Works: London, Dumbarton and Hillington

The finer points of SWITCHGEAR DESIGN



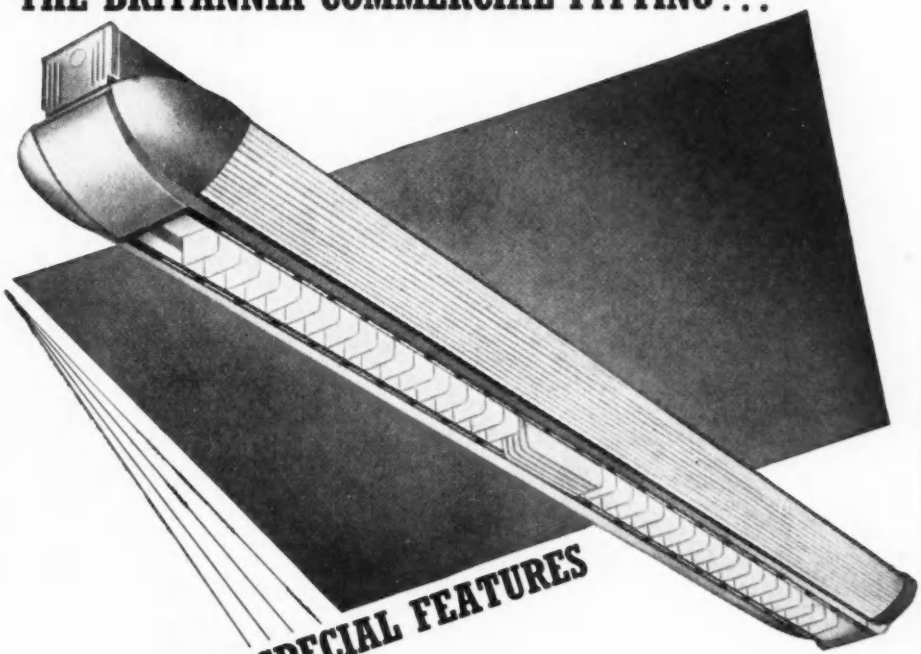
HEAVY DUTY METALCLAD SWITCHGEAR

A Condenser bushing busbars
B Continuous trunking for bus wiring
C Door giving access to the ancillary apparatus
D Low oil content circuit breaker
E Roller shutter enclosing front of the unit
F Multi-core cable box conveniently situated behind unit
G Voltage transformer
H Cable boxes suitable for all types of cable
I Isolating contacts in vertical porcelain spout insulators
J Oil-filled connecting chambers facilitate removal of current transformers
K Current transformers mounted on condenser bushings are readily accessible

G.E.C.

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

THE BRITANNIA COMMERCIAL FITTING...

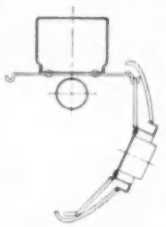


WITH THESE SPECIAL FEATURES

- HINGED LOUVRE-DIFFUSER
- UNIQUE ETCHED SILVER FINISH
- SPRUNG LAMPHOLDERS
- GOOD UPWARD LIGHT

The Commercial Fitting, in common with all Britannia fittings, combines fine looks with the many technical refinements, not only for extreme simplicity of erection and maintenance but for general lighting efficiency:—

1. Direct lamp light above the horizontal.
2. Diffused light only in all zones from the horizontal to 40° below it.
3. Direct lamp light plus diffused light, in all zones lower than 40°, on to the working plane.



Louvre open for cleaning and lamp replacement.

Britannia

ONE OF BRITAIN'S LARGEST MANUFACTURERS

Fittings with features

BRITANNIA ENGINEERING CO. ASHTON RD., LUTON, BEDS. LUTON 4082

Monarch

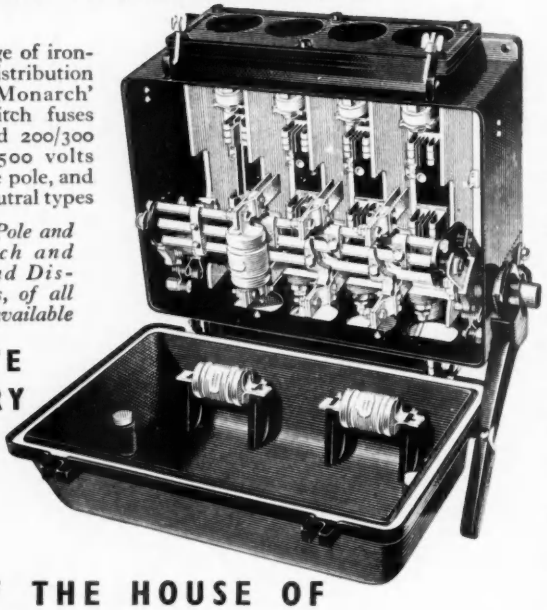
RANGE OF

SWITCH-FUSES

The Simplex range of iron-clad switch and distribution gear includes 'Monarch' switches and switch fuses 100/150 amp. and 200/300 amp. capacity, 500 volts double pole, triple pole, and triple pole and neutral types

Simplex Single Pole and Neutral Switch and Fuse Gear and Distribution Boards, of all capacities, now available

IMMEDIATE DELIVERY



MADE BY THE HOUSE OF

Simplex

Simplex Electric Company Limited
Oldbury Birmingham and Branches

A TI COMPANY

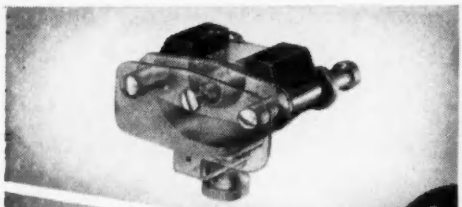
Coolicon REGD. *is in the news!*

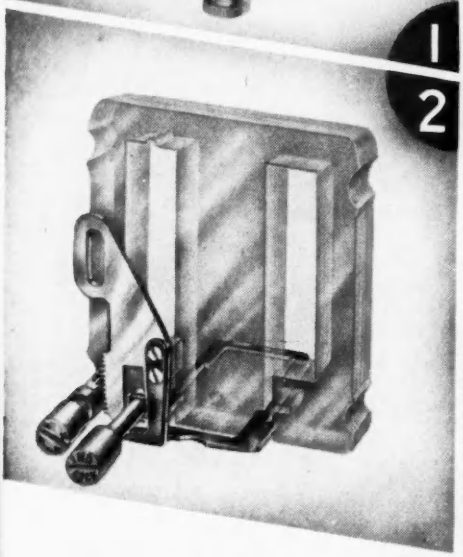
When you see them you'll want them
Here's the bright answer to your need for better lighting! COOLICON Shades, in Plastic, with white or coloured galleries, or in Metal. As serviceable as they're smart—as efficient as they're economical. The maker's name guarantees the quality.
BENJAMIN Coolicon REGD. SHADES
Ask to see one illuminated in your local Electric Suppliers Show
THE BENJAMIN ELECTRIC
Brantwood Road, Tottenham, London, N17
Bolton
THE DAILY MAIL
Nottingham Evening Post
Telegraph & Argus
The Coventry Evening Telegraph
Leicester Mercury
BRISTOL EVENING POST
Express and Star
Bath & Wilts Chronicle & Herald
Huddersfield Daily
Courier AND Advertiser
The Dress

This is just one of the COOLICON advertisements, appearing regularly in newspapers and magazines throughout the country. Stock up with COOLICONS NOW, in readiness for the inevitable demand. The Range comprises 9″ or 11″. All Plastic models (galleries in black, green, blue or white) and an all-metal model, 9″ or 11″ vitreous enamelled green outside and white inside. Sales Aids available.

BENJAMIN REGD.

THE BENJAMIN ELECTRIC LTD.
Brantwood Road, Tottenham, London, N.17
Telephone: TOTtenham 5252 (5 lines)





★ ADJUSTMENTS

1 MAIN LOAD
2 INDUCTIVE LOAD
3 LOW LOAD

1 ★
2 3

Backlash has been eliminated on main load and low load adjustments and reduced to a minimum on the inductive load adjustment.

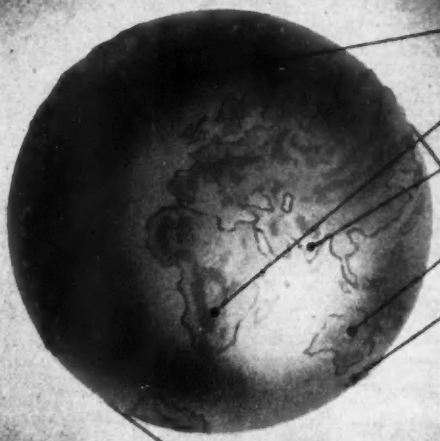
All adjustments have a large range, are smooth and positive in action and can be locked.

FERRANTI

FERRANTI LIMITED
Hollinwood · Lancashire
London Office: Kern House, Kingsway, W.C.2

FM96

FERRANTI
F M Meter



CANADA
SOUTH AFRICA
INDIA & PAKISTAN
AUSTRALIA
NEW ZEALAND

Renowned throughout the World for Quality..

DEPENDABILITY

ELEPHANTIDE
Regd.

PRESS BOARD INSULATION

Manufactured by

B. S. & W. WHITELEY LTD.

Pool-in-Wharfedale - Yorks.

Telephones: Arthington 98 and 99 Telegrams: Whiteley, Pool-in-Wharfedale

London Office: 101 HIGH HOLBORN, W.C.1 Telephone: CHAncery 7646

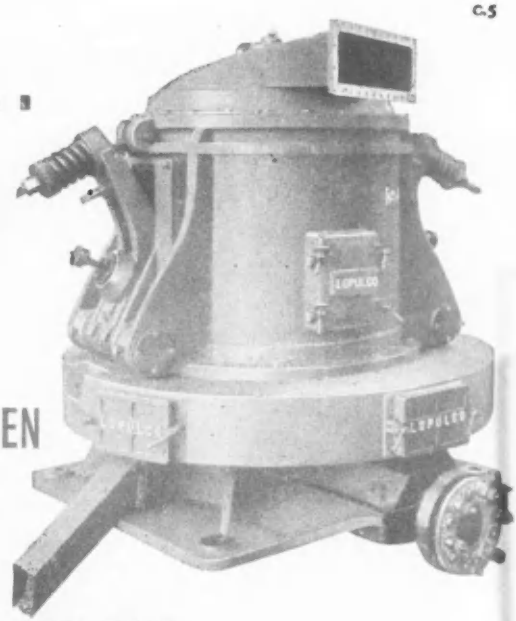
HACKBRIDGE AND HEWITTIC ELECTRIC CO. LTD., WALTON-ON-THAMES, SURREY

Telephone: Walton-on-Thames 760 (8 lines) Telegrams: "Electric," Walton-on-Thames

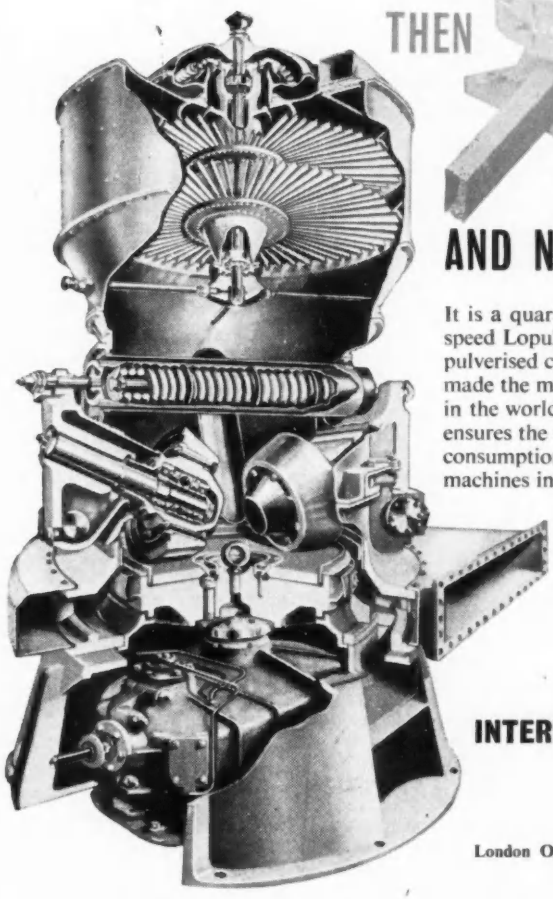
C.5

PROGRESS...

the Lopulco Mill



THEN



AND NOW

It is a quarter of a century since the first medium-speed Lopulco roll-mill was used in connection with pulverised coal firing. Constant improvements have made the modern Lopulco Mill the finest of its type in the world. An integrated whizzer-type separator ensures the specified particle size at all times; power consumption and space requirements are low for machines in this category. In operation the Lopulco Mill has a minimum noise level and does not require excessive maintenance. It is a typical product of ICL development. May we send you further details?

INTERNATIONAL COMBUSTION LTD

ICL

London Office: NINETEEN WOBURN PLACE, W.C.1

Works: DERBY, ENGLAND; PORT ELIZABETH, SOUTH AFRICA; SYDNEY, AUSTRALIA

By courtesy of the Birmingham Small Arms Co. Ltd.

THEY DO IT *OUR* WAY USING

FRYOLUX SOLDER PAINT

The illustration shows a sectioned B.S.A. Bantam fork tube with M.P.C. high duty porous bronze bushes sweat soldered with Fryolux solder paint. The bushes are coated externally with Fryolux solder paint, inserted into the fork tube and heated by high frequency method. "Fryolux" solder paint shows a great advantage over all other methods for all sweat soldering purposes.

FMF

FRY'S METAL FOUNDRIES LIMITED

TANDEM WORKS · MERTON ABBEY · LONDON SW 19 · MITCHAM 4023

AND AT MANCHESTER, GLASGOW, BRISTOL, BIRMINGHAM AND DUBLIN

ELECTRICAL TIMES

Vol. 120 No. 3128 THURSDAY, 18 OCTOBER, 1951

PUBLISHED EVERY THURSDAY

SIXTIETH YEAR OF PUBLICATION

THE B.E.A. YEAR 1950-51 685

AREA BOARD PROGRESS 695

R.F. HEATING SPEEDS BLOCK-BOARD PRODUCTION 697

OUR READERS' VIEWS 698

SMALL MOTORS. No. 3. D.C. AND SYNCHRONOUS MOTORS, *by J. L. Watts, A.M.I.E.E.* 699

POWER FOR TEXTILE PRODUCTION 703

THE I.E.E. INAUGURAL ADDRESS 704

ELECTRICAL SAFETY 706

NOTES ON WIRING, *by Megohm* 707

PROBLEMS AND PRACTICE IN ENGINEERING 708

OVERSEAS NEWS 710

PERSONALITIES IN THE INDUSTRY 712

NEW LITERATURE 714

ESSENTIAL RESEARCH 715

ENGINEERING IN AGRICULTURE 716

THE BUYER'S COLUMN 717

THE WEEK IN NEWS 719

Electric Supply News 724

Company Activities 725

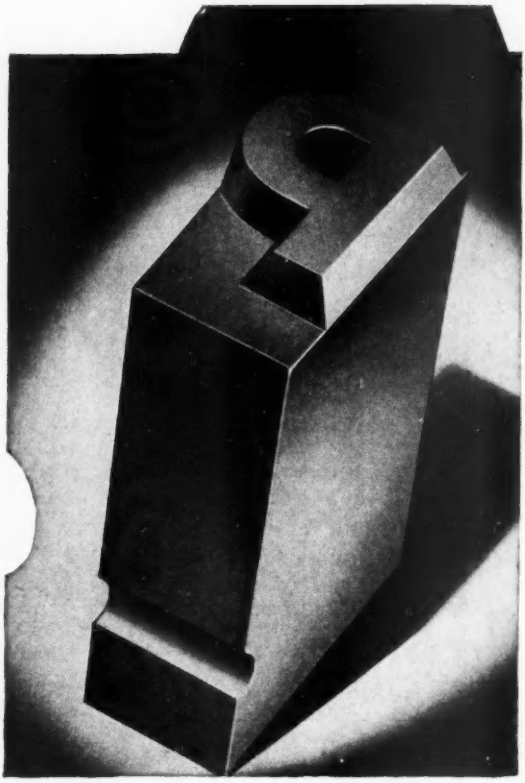
COMMERCIAL INFORMATION 726

CLASSIFIED ADVERTISEMENTS *61*

INDEX TO ADVERTISERS *70*

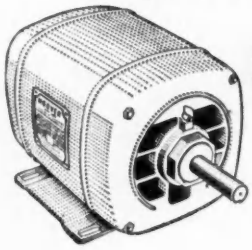
SUBSCRIPTION RATES —United Kingdom and Overseas £1 17s. 6d. per annum. Canada C$7·50c., U.S.A. $7·50c. per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque or international money order. Single copies 6d. each.

OFFICES — SARDINIA HOUSE, SARDINIA STREET LONDON, W.C.2
Telephone - HOLborn 6016 Telegram - Equivolt, Estrand, London



PORTRAIT OF POWER

"WITH twenty-six soldiers of lead I have conquered the world . . . " It was a printer, not a great general, who made that bold claim. If there is pride in the words, it is a justifiable pride. That is a feeling well understood by Hoover Limited, whose fractional horse-power motor is another outstanding example of a compact and convenient source of power that has gained rapid acceptance throughout the world.



HOOVER LIMITED

INDUSTRIAL PRODUCTS DEPARTMENT

CAMBUSLANG · LANARKSHIRE · SCOTLAND

Editorial

THE THIRD YEAR

ONCE again the B.E.A. has succeeded in nicely balancing its accounts so as to provide an unostentatious surplus. This year the figure of £6·3 million is slightly down on last year, which is mainly attributable to the unexpected need to create a taxation reserve fund which absorbs £3·5 million. The form of the Report broadly follows the previous pattern, but considerable detail improvement has been made in the display of the tables and the presentation of information, for which we must be thankful. The increase in price of the report from five and six to eight shillings will be accepted sympathetically by all familiar with the rise in publication costs. On the other hand, the B.E.A. can proudly point to a fall in the average revenue per unit from 1·2d to 1·18d. This is wholly due to increased consumption by consumers on two-part tariffs and certainly the year has been exceptional in producing an increase of 12·3%, a figure that has only been surpassed once before. The sections principally responsible for this increase were farms (28·3%), public lighting and commercial users, while the domestic consumer who is usually blamed for such expansion, increased consumption by 12%. What has not yet become clear is whether this high rate of increase is to be taken as an indication of future expansion or whether it is in the main a balancing up of the 6·2% increase of the previous year, and that average growth will settle down to the normal pre-war figure of 10%.

ENGINEERING FEATURES

THE engineering section of the report shows a marked improvement on former years, and it is refreshing to find amidst the masses of necessary but monotonous figures, a simple unvarnished tale of a busy day in the national control. The account of conditions of load flow during a day of heavy loading should emphasise to all how great is the need for transmission reinforcement, and how difficult is the work of our control engineers. The commercial section is also improved and its highlight is a discussion of that topical but contentious subject of consumer load control. Certain tests are being carried out but it seems clear that by the time adequate results have been obtained, assuming they are favourable, and the necessary equipment made and installed, the time will have been reached when generating plant should be catching up on its back log. But Meteor must not at this time go into too detailed a comment; that will be a matter for the review which, in accordance with our usual custom, will be published in the issue following the detailed abstract of the Report to be found on a later page.

NO! MR. MINISTER

A GOOD time seems to have been had by all last week at the conference called by the Combustion Engineering Association to discuss fuel and power problems. Electricity was hailed as a medium for lighting and power but it seems to have been agreed by all present that its day as a method of heating is over. Its place is to be taken by those smokeless fuels which seem almost to be non-existent at the present time. Even the Minister of Fuel was most optimistic on this score. Area boards have stopped the sale of electric fires, the Government has taxed them, has restricted their manufacture and is going to restrict them still further until electric fires will become even more difficult to obtain than coke. All this is dedicated to that grand panjandrum, a co-ordinated fuel policy. Unfortunately, this wondrous policy, like some mighty god, is spoken of with bated breath and is waited on by *ad hoc* committees in that holy of holies at Millbank, away from the profane eyes of ordinary mortals. Judging

by acts alone, the co-ordinated policy is the very antithesis of co-ordination; it is no more than the open advocacy of solid fuel against all comers. The claims of electric heating for a place in a real policy of fuel economy need not be iterated here. It is sufficient to point out that the final arbiters are the public; so far a 100% tax has failed to still the demand for fires, other methods may be successful in suppressing it but the need for a simple, clean and readily available means of occasional heating will remain until the millennium of central heating in every single home is attained.

RAISING THE VOLTAGE

THE picture painted by Sir John Hacking in his Presidential Address to the I.E.E. of the planned future of bulk transmission was both bold and heartening. High voltage transmission is, of course, not new. Experience is available in many countries abroad, but the 275 kV grid scheme for Great Britain, with its special implications, is different in essence from overseas schemes which were mainly dictated by the location of hydro-power. Primarily the system will reinforce the existing 132 kV grid. Its secondary function will be to transmit power from the coal mining areas to the rest of the country, thus eliminating much of the costly freight charges incurred by transporting coal. The fact that by 1960 some 70% of the coal mined for outside use in East Midlands and Yorkshire mining areas should be used on site and transmitted in the form of electricity, is, indeed astonishing. It is to be hoped that no objections will be allowed to impede progress on this scheme, so vitally important to the future well-being of the country. Certainly it will overcome the arterial sclerosis which is the ailment from which the grid is suffering at the present time.

PREVENTION IS BETTER . . .

THAT prevention is better than cure is axiomatic—but how often do we heed it, and how often do we neglect prevention and assume that the cure will be provided *if* the trouble occurs? Television interference is a case in point. Normally the Post Office is expected to trace the cause of persistent interference and provide a remedy where necessary or practicable. Now the Post Office is breaking fresh ground in tackling potential trouble before it happens. In the Holme Moss television area they are offering an advisory service on the prevention of interference by users of electro-medical equipment, either by screening or alteration of frequency. Not content with this alone, they are attacking at the root of the trouble by asking manufacturers to design their equipment on frequencies outside the television range, and to make available the necessary parts for change of frequency. By inaugurating this service and—possibly even more important—providing a simple routine for the public to set it in motion, the Post Office is performing a valuable service.

ANOTHER CURE

THERE is, of course, another side to this question of interference suppression, as those who try to legislate soon discover. Their natural tendency to order people to prevent its generation is soon countered by suggestions that suffering listeners and viewers might well lessen their own troubles by paying more attention to aerial and earth. This see-saw of debate seems to be reflected in the publishing programme of the British Standards Institution. Last week, a standard on the limits of radio interference provided a subject for these columns; hard on its heels has come a Code of Practice dealing with arrangements for the reception of sound and radio broadcasts. The many steps to obtain a good signal to noise ratio which are described as good practice in the Code are certainly not in evidence in most homes. When a comparison is made of the cost of fitting suppressors to ensure an extra degree of radio silence for several occasionally used domestic appliances, with that of improving reception by trying something better than an indoor aerial with no earth, propaganda in favour of the latter step seems worth while.

Meteor

The B.E.A. Year 1950-51

SLIGHTLY smaller than either of its forerunners, the third Annual Report and Statement of Accounts of the British Electricity Authority nevertheless retains the revised arrangement adopted in the last issue, and the cuts in space are due to a speeding-up in the general tempo rather than to the omission of any information previously given. The report covering generation and transmission; commercial operations; administrative and miscellaneous; and finance, covers 160 pages. There are now 45 appendices, and Appendix 5, giving Area Board statistics, had been considerably enlarged.

Engineering . . .

THE chapter devoted to generation and transmission deals in some detail with the general power situation of the country. At March 31, 1951, the Central Authority owned 289 power stations with a total installed capacity of 14,592 MW and a total maximum output capacity of 13,156 MW. Steam stations accounted for 12,924 MW, waste heat for 10 MW, internal combustion for 50 MW, and hydro for 172 MW. New power stations brought into commission during the year included Croydon B (S.E. Div.), Agecroft H.P. (N.W. Div.), and Poole (S. Div.). The first two of these operate at steam pressures of 600 lb/sq in. 850° F and the last at 900 lb/sq in., 925° F. New sections came into operation at Stourport B (Midlands Div.), Portobello (S.E. Scotland Div.) and Peterborough (E. Div.). At Stourport B operating conditions are 1,250 lb/sq in., 950° F, and at Portobello they are 1,350 lb/sq in., 950° F. The latter installation comprises one 60,000 kW cross-compounded set, supplied from one 540 k.lb/hr boiler; this is the largest boiler in any of the Authority's stations.

Table No. 3 shows the net increases in installed generating capacity, boiler evaporative capacity, and maximum output capacity for the year.

Plant shut down had an average age of 34 years for generating sets, and 35 years for boilers, and included in this particular category were eight small stations, viz., two hydro stations, Maxwelltown and Dee; four diesel stations, Bexhill, Brixham, Sedberg, and New Quay; one refuse destructor station, Falmouth, and one steam station, Crewe. The whole of the generating plant of 5,000 kW capacity of Bloom Street (Manchester) was also shut down, but the boiler plant continues in operation, supplying steam to a number of important buildings in the city centre.

Plant Programmes

The plant programmes from 1946 to 1956 are set out in the table, and it can be seen how far realisation has fallen short of anticipation. The shortage of plant over the 1950-51 winter was aggravated by the somewhat high percentage of plant out of commission due to breakdown, overhaul, unsuitable fuel or other causes, which amounted to no less than 14·9% of maximum output capacity, averaged over Monday to Fridays in January, 1951. Some 2% of this outage was due to teething troubles with plant which had to be rushed into commission to meet winter peak-loads. The 1949-50 outage figure over the same period was 11·4%. The worst figure occurred in 1948 when the outage reached as high as 15·1%. This high figure, however, reflected the maintenance back-log of the war period to a certain extent.

Table 1. Figures for Steam Stations 1950-51
Figures refer to the group of stations in each efficiency range.

Overall Thermal Efficiency for Year	Max. Output Capacity	kWh Output	1949/50 kwh Output
%	% of Total	% of Total	% of Total
28 and over	1·4	1·5	—
26 to 27·99 ...	11·8	16·1	13·4
24 to 25·99 ...	19·5	25·2	21·1
22 to 23·99 ...	17·8	20·4	17·8
20 to 21·99 ...	15·1	15·0	22·1
18 to 19·99 ...	8·4	7·5	14·2
16 to 17·99 ...	8·3	5·6	5·9
14 to 15·99 ...	6·8	4·1	2·6
12 to 13·99 ...	5·4	2·6	1·3
10 to 11·99 ...	4·3	1·6	1·2
Under 10 ...	1·2	0·4	0·4

Plant Programmes, Planning and Construction

The supplementary programme for 1955 and the programme for 1956, approved during the year, comprise four new stations, extensions to 16 post-war stations and extensions to nine pre-war stations. These programmes, together with the provisional plant programmes for 1957 and 1958 and the tentative proposals for 1959 and 1960 include provisions for transmission over the future 275 kV system, of gradually increasing quantities of power from the stations situated in the developing coalfields of the East Midlands and Yorkshire, to the coal importing areas of Lancashire, Merseyside, London and the Southern Counties. In respect of the programmes for 1955 (supplementary) and 1956, it was estimated that, at the price levels ruling in 1950, the average capital cost would be about £50 per kW. This price was lower than that estimated for the 1953-55 programme, due to the utilisation of space existing in power stations already built, a lower ratio of boiler capacity to turbo-alternator capacity, and greater co-ordination and control of design.

Arrangements have been made to ensure sufficient boiler making capacity to fulfil these programmes. All the sets, with the exception of units below 400 lb/sq in. and above 900 lb/sq in. will be standard types. Some 460 MW are, however, above 900 lb/sq in. and included in this category will be four 100 MW sets. Two will be at Castle Donington (1,500 lb/sq in., 1,050 F) which will make four similar units in the station, with two more to follow. A third set will be the first of four in a new station at Willington, near Derby, and the last 100 MW set will be the first of three to go in at a new station alongside Ferrybridge (Yorks). The remaining set, with the same steam conditions, will be the third of four such units at Meaford B (Staffs). The Ferrybridge station will probably use a reheat cycle, although this is more sensitive to fuel quality and operating conditions than the normal cycle.

The development of this installation, however, will provide experience of great value in

Table 2. Plant Capacity Programmes

Calendar Year	Plant Capacity Programmed for Year	Capacity of Plant in Service from Programmes			Capacity of Plant Outstanding from Programmes		
		at end of 1948	at end of 1949	at end of 1950	at end of 1948	at end of 1949	at end of 1950
	MW s.o.	MW s.o.	MW s.o.	MW s.o.	MW s.o.	MW s.o.	MW s.o.
1946	934	711	893	964	253	71	—
1947	998	331	576	813	667	422	185
1948	1,089	—	208	429	1,089	881	660
1949	1,328	—	30	428	1,328	1,298	900
1950	1,437	—	38	76	1,437	1,399	1,361
1951	879	—	—	—	879	879	879
1952	1,292	—	—	—	1,292	1,292	1,292
1946-52	7,987	1,042	1,745	2,710	6,945	6,242	5,277
1953	215						215
1954	771						771
1955	1,581						1,581
1956	1,779						1,779
1946-56	12,333			2,710			9,623

Table 3. Changes in Generating Capacity

Year Ended March 31, 1951	Installed Generating Capacity	Boiler Evaporative Capacity	Maximum Output Capacity
	kW	klb hr	MW s.o.
New plant installed*	+ 901,700	+ 11,360	+ 918
Plant acquired or recommissioned	+ 14,125	+ 200	+ 12
Revised ratings of existing plant, net decrease ...	— 6,945	— 719	— 48
Plant shut down	— 100,500	— 1,226	— 63
Net increases	+ 808,380	+ 9,615	+ 819

* *The corresponding figures for* 1949-50 *were* 1,004,800 *kilowatts (installed),* 9,089,000 *lb. per hour, and* 831,000 *kilowatts (sent out). Thus, although the total installed capacity of new generating sets was less in* 1950-51 *than in* 1949-50, *the considerably greater new boiler capacity resulted in a higher maximum output capacity of new plant.*

assessing the type of plant best suited for further general use by the B.E.A.

When fully developed, the plant with higher steam conditions, which the Authority had in hand on March 31, 1951, will consume over 5 million tons of coal per year. It is, however, thought that the qualities of coal likely to be available in future years may impede the general development of this type of plant with its high thermal efficiency.

Engineering - Although increase in installed capacity less than previous year, increase in output capacity greater. . . . Teething troubles in new plant accounted for 2% outage during winter. . . . Steady progress maintained developing 275 kV grid. . . . Mal-operation of protective gear showed slight increase. . . . Improvement in thermal efficiency continued.

The Grid

Owing to the transfer of many 66 kV lines and substations to the Area Boards, the 66 kV and lower route miles administered by the Authority have dropped by 1,202. The 132 kV system has, however, been reinforced by some 284 route miles, bringing the total up to 4,037. Overhead accounted for 3,992 of these and underground cables for 45.

Major 132 kV works completed include a new substation at Beddington where 15 out of an ultimate 24 circuits of outdoor air blast circuit-breakers were brought into commission. Eleven of 14 circuits of a new substation at Bromborough were completed, and substantial additions were made at Corby and Staythorpe. Work continued on the 41 miles of single circuit 275 kV line between Staythorpe and West Melton and it was hoped to complete this in 1951. Shortage of materials is however making progress difficult.

Work put in hand during the year included 265 route-miles of 132 kV line and 371 route-miles of double-circuit 275 kV line.

Maintenance continued on a comprehensive scale. Some 1,500 towers were repainted and tests on insulators carried out with the lines alive showed an increased proportion of faulty units—0·8% as compared with 0·4% in 1949-50—mainly due to the deterioration of a particular type manufactured in 1940. Many new points of supply between the Authority and the Area Boards have been agreed upon.

Provisional orders for a substantial number of 275 kV circuit-breakers were placed with British manufacturers during the year. These breakers, which are to have a short-circuit rating of 7,500 MVA are due for delivery in 1954. Detailed specifications have been sent out with enquiries for the supply of 17—120 MVA, 275 kV transformers required by the end of 1954. Discussions with manufacturers also continued on the design of 275 kV cables, of which a limited amount will be required.

During the year there were 352 system faults compared with 660 in 1949-50. The reduction was attributable in part to the transfer of 66 kV lines to the Area Boards and also to the comparatively good weather. Correct clearance

Table 4. Output from Generating Stations 1950-51 Grouped According to Division
(Thousands of units of electricity)

Generation Division	Maximum Output Capacity, Mar. 31, 51 MW	% Increase on 1950	Generated by Steam Plant	Total Generated including I.C. and hydro	Used in Stations	Sent out from Stations	% Increase on 1950	Works Cost/ Unit s.o.
London ...	2,416	0·4	9,886,118	9,888,200	540,987	9,347,213	9·0	0·5648d.
S. Eastern ...	748	14·0	2,596,361	2,613,095	158,424	2,454,671	36·4	0·5417d.
Southern ...	443	11·9	1,597,958	1,607,411	85,256	1,522,155	18·5	0·5916d.
S. Western ...	506	3·7	2,017,464	2,040,363	117,152	1,923,211	11·9	0·5821d.
Eastern ...	764	13·7	2,958,203	2,964,681	189,127	2,775,554	32·9	0·5319d.
E. Midlands	1,061	14·9	3,965,799	3,966,214	226,667	3,739,547	20·0	0·4372d.
Midlands ...	1,453	6·0	6,260,042	6,261,233	396,846	5,864,387	9·5	0·4486d.
S. Wales ...	581	4·9	3,090,501	3,105,852	195,080	2,910,772	11·2	0·4132d.
M. & N. Wales	568	—1·0	2,634,258	2,767,703	160,463	2,607,240	7·2	0·5112d.
Yorkshire ...	1,414	8·4	6,595,009	6,595,830	367,975	6,227,855	11·3	0·4078d.
N. Eastern ...	669	11·5	3,245,830	3,247,447	191,222	3,056,225	11·7	0·4364d.
N. Western ...	1,620	4·1	6,798,107	6,801,381	341,993	6,459,388	14·6	0·4836d.
S.E. Scotland	216	16·1	882,250	882,250	40,842	841,408	2·8	0·5195d.
S.W. Scotland	697	3·4	2,469,615	2,835,599	120,550	2,715,049	10·9	0·4717d.
Totals ...	13,156	6·6	54,997,515	55,577,259	3,132,584	52,444,675	—	0·4885d.
% of Total Generated	—	—	98·96	100·00	5·64	94·36	—	—
% Increase on 1949-50 ...	6·6	—	13·2	13·1	10·5	13·3	—	0·4

Table 5. Grid Transmission
Summary of Statistics

Quantity	March, 1951	March, 1950	Change
Total installed capacity (MW)	14,592	13,784	+ 808
Number of stations	289	293	— 4
Capacity of 132 kV grid transformers (MVA)	12,597	11,722	+ 875
Capacity of 66 kV and lower voltage grid transformers (MVA) ...	3,496	3,658	— 62
Route miles of 132 kV o.h. lines ...	3,992	3,710	+ 282
Route miles of 66 kV and lower voltage o.h. lines* ...	995	1,257	— 262
Route miles of 132 kV underground cables	45	43	+ 2
Route miles of 66 kV and lower voltage underground cables*	407	414	— 7

**Including Area Board lines maintained by Central Authority.*

however was only obtained in 87·7% of the cases compared with 92·5% for the previous year. Several promising new designs of protective gear were introduced and much attention was given to the preparation of schemes of protection for the 275 kV grid.

Research

At Leatherhead, the British Electricity Authority's new laboratories were formally opened by Lord Citrine. Work continued on the h.v. experimental transmission line which remained operating at 250-300 kV throughout the year. Many other problems were investigated and three "development" activities were transferred to engineering research. These included the Pimlico District Heating Scheme, a new thermo-dynamic cycle involving gas-turbine techniques, and the 100 kW wind-power generator. Corrosion problems received much attention, particularly as far as steel-cored aluminium conductors were concerned.

Table 6.
Technical Details and Costs of Generation at Steam Stations

Item	Units	1950-51	1949-50	% Change
Maximum output capacity, end of year	MW	12,924	12,101	+6·9
Electricity generated	kWh x 10⁶	54,942	48,632	+12·9
Electricity used in power stations	kWh x 10⁶	3,125	2,827	+10·6
Electricity sent out	kWh x 10⁶	51,817	45,805	+13·1
Electricity supplied from fuels*	kWh x 10⁶	51,815	45,802	+13·1
Average load ...	% max. cap.	47·1	44·7	+ 5·4
Average calorific value of fuel ...	B.Th.U./lb	10,948	10,898	+ 0·5
Average delivered price of fuel	d./ton	608·7	586·7	+ 3·7
Fuel consumed for generation ...	tons x 10³	33,468	30,011	+11·5
Fuel consumed for generation ...	lb/kWhs.o.	1·447	1·468	— 1·4
Overall thermal efficiency ...	%	21·54	21·33	+ 1·0
Cost/kWh sent out:				
Fuel ...	d.	0·3932	0·3845	+ 2·3
Fuel handling, etc.	d.	0·0228	0·0233	— 2·1
Operation, salaries and wages	d.	0·0308	0·0327	— 5·9
Oil, water and stores ...	d.	0·0035	0·0038	— 8·0
Repairs and maintenance	d.	0·0391	0·0429	— 8·9
Total works cost	d.	0·4894	0·4872	+ 0·5

** Excludes electricity supplied from refuse or purchased steam.*

After a section dealing with the operation of the Grid, which contains at length an account of events of December 14, 1950—a bad winter day on which extensive load-shedding had to be carried out, the chapter concludes with some facts on generation.

In the year under review the total quantity of electricity generated at power stations was $55{\cdot}577 \times 10^9$ units, 13·1% more than the previous year's figures and 32·9% more than 1947-48. Units sent out were $52{\cdot}445 \times 10^9$, exceeding the previous year's total by 13·3%.

Thermal efficiency continued to rise, being 21·54% compared with 21·33% in 1950, 21·15 in 1949 and 20·86 in 1948. Average works costs increased from 0·4872d. in 1949-50 to 0·4894d. in 1950-51. Fuel consumption was slightly greater than estimated, and the quantity of coal delivered was below that allocated by the Ministry of Fuel and Power, mainly as the result of bad weather affecting the output of opencast coal. Total quantity of fuel consumed was 33·61 million tons—11·5% more than in 1949-50.

Throughout the winter, the acute shortage of railway wagons necessitated greater use of road haulage at increased cost. Seaborne supplies were eased by the addition of six more vessels to the Authority's fleet of sea-going colliers, making the number thirty-six.

The pithead prices of coal increased by 4s. 2d. per ton in February, 1951. As the coal used by the Authority is mainly of lower grade than that used by industry in general the electricity industry had to bear a disproportionate share of the increase in national coal costs. Railway freight charges increased by 16 2/3% in May 1950, and at the same time road haulage costs went up. Further increases in transport occurred in Jan. 1951. As a result of these increases the average delivered cost of coal to the power stations was 13·6% higher in March 1951 than in April 1950. In the first quarter of 1951, however, there was a small increase in average calorific value due to the use of American coal which had a calorific value of some 20% higher than that of the British coal used by the Authority.

Commercial . . .

IT will be recalled that throughout 1950-51 the weather was generally cold and unfavourable. As a result, the potential peak-load on the Authority's power stations was considerably higher in each month than a year earlier—in only one month (June, 1950) was the average mid-day temperature for the month above normal. The maximum potential demand, on December 18 last, was 13,448 MW —some 1,166 MW higher than that of the previous year. The weather conditions were largely responsible for the large increase in units sold. Sales of electricity to all consumers during the year under review amounted to 46,580 millions, an increase of 12·3%, which is almost double the rise recorded on the previous year.

Increased Consumption

In a classification of types of consumers, the largest increase in consumption was registered by farms (28·3%), while use for public lighting was up by 15·3%, by commercial consumers 16·7%, and domestic 12%. Industrial sales were 11·8% higher, and, compared with the pre-vesting year 1947-48, were 32·3% up, which can be compared with the 23·6% expansion in industrial production as measured by the Board of Trade index. Since 1947-48 the increase in farm consumption has increased by 93·5%, indicative of the rapid progress of the Area Boards in that sphere.

The number of consumers connected increased by a further 449,400 to a total of 13,079,473 at March 31 last. Here again the largest percentage rise was for farms, of which 9,933 were given a supply during the year. New domestic consumers totalled 397,065 compared with 401,100 in the previous twelve months. The total number of consumers on d.c. supplies is again not given, and an appendix reveals that this is because the information relating to the London Electricity Board is not available. For the other 13 boards, the aggregate of d.c. consumers is 472,908.

In regard to power supplies, the B.E.A. purchased 150 million units during the year from the North of Scotland Hydro-Electric Board, and some 243 million units from private generating stations. The Area Boards also purchased a further 181 million units from private concerns, with the approval of the Authority. In regard to supplies to the Southern Railway, about half of which is given at 25 c/s, work has already started to augment the decision of the Railway Executive to change over to 50 c/s operation.

Commercial.—Units sold totalled 46,580 millions—an increase of 12.3%. . . . Farms showed largest increase in consumption (28.3%). . . . Consumers connected amounted to 13,079,473, a rise of 449,400 of which 397,065 were domestic. . . . Hire, hire-purchase and credit sales again increased. . . . Tests on peak-load control methods. . . . Off-peak tariffs.

Retail Sales

Turning to retail sales, after noting that the balance in respect of the Clow surcharge, amounting to £1·6 million, was returned to consumers, some details of the rising costs affecting the Boards are enumerated. These, in total, amount to about £14 million for the year 1951-52, and the Boards were asked to submit proposals for necessary tariff revisions. Reference is also made to the substantial progress made in formulating new standard tariffs, more particularly for domestic supplies. The restriction on capital expenditure on rural development did not affect the year's operations as there was a considerable amount of work already in hand. And, as the Boards have completed the surveys of their rural areas and prepared plans to serve them, they will be able to step up development when the restrictions are relaxed. Hire, hire-purchase and credit sales business of the Boards again increased during the year. The sum outstanding on h.p. and deferred payments not yet due being £10,697,835, compared with £5,257,610 a year ago. Apparatus and wiring provided on hire accounted for 13% of the total value, as compared with 55% in 1937-38.

Load Control

Guidance on estimating maximum demands on which to base designs of new residential

Table 7. Energy Sales Compared with 1949-1950

Area Board	Increase in Total Sales % of 1949/50	Classification	Increase in Total Sales % of 1949/50
London ...	—7·0	Lighting, fla. rate ...	3·5
S. Eastern	13·8	Heating, etc., flat rate	9·9
Southern ...	15·0	Domestic, 2-part ...	15·1
S. Western	12·5	Commercial, 2-part ...	15·1
Eastern ...	14·9	Farming	39·0
E. Midlands	12·1	Large power ...	11·9
Midlands ...	14·1	Public lighting ...	15·3
S. Wales ...	11·8	Traction	0·7
M./N. Wales	13·5	Total A.B. sales ...	12·2
Yorkshire	8·9	Inter-Board sales ...	—71·0
N. Eastern	10·1	B.E.A. sales to railways	4·3
N. Western	13·5	Total sales of electricity	12·3
S.E. Scot.	13·7		
S.W. Scot.	9·5		

distribution systems was the subject of one report by the Utilisation Research Committee during the year. Large-scale field tests on the characteristics of the domestic cooking and water heating loads were also made in several areas. There follows an examination of methods of control of consumers' loads, in an effort to avoid power cuts, starting with the recommendations of the Clow Committee for the use of load-limiters, change-over switches, frequency sensitive relays, or other devices. With all of these, however, there are drawbacks, and it is considered that some system of central control, to disconnect particular loads or to limit the amount of load taken at peak periods is the best line of approach to the problem. While recognising that control of the space-heating load, if practicable, offers the possibility of the most substantial reduction at peak times, it is realised that a tariff incentive reasonably related to the costs of supply is unlikely to prevent consumers using electric space heating in abnormally cold weather.

Already the Area Boards are developing the uses of off-peak electricity for such purposes as large-scale space-heating, and the E.R.A. is undertaking research into the problems of thermal storage heating for the smaller consumer. Meanwhile, large-scale tests are being conducted in Merseyside and in South-west Scotland on the prospect of peak-load control for small supplies to obtain information on the types of consumers who would take advantage of alternative forms of concessionary rates of charge, and the effect on electricity consumption, revenue, etc.

Table 8. Consolidated Accounts, 1950-1951

	B.E.A. and Area Boards Consolidated Accounts	Central Authority Accounts
	£	£
Sales of electricity ...	229,210,768	148,451,383
Sales of steam	426,005	426,005
Rentals of meters, etc. ...	3,890,096	—
Income from public lighting maintenance	1,478,091	—
Surplus on contracting and sales of fittings ...	1,068,350	—
1950: £213,669,028	**236,073,310**	**148,877,388**
Deduct:		
Generation: works costs...	106,441,761	106,441,761
Purchase of electricity from other sources ...	1,665,750	1,254,884
Main transmission: operation, repairs, and maintenance	1,314,350	1,314,350
Distribution: Operation, repairs and maintenance	22,000,951	—
Rents, insurances, etc. ...	1,656,751	673,371
Payments in lieu of rates	12,210,690	5,241,910
Administration and general expenses	27,231,568	5,337,961
Change of systems of supply (consumers' apparatus)	419,277	—
Depreciation of fixed assets	30,061,287	14,594,665
1950: £188,737,971	**209,002,385**	**134,858,902**
Consolidated Net Surplus from Trading, 1950: £24,931,057	**27,070,925**	**14,018,486**
Add:		
Income from subsidiary companies	31,833	31,833
Rents receivable and other miscellaneous income ...	873,137	16,464
1950: £790,722	**904,970**	**48,297**
1950: £25,721,279	**27,975,895**	**14,066,783**
Deduct:		
Interest	20,434,279	10,604,565
Financing expenses ...	264,439	127,027
Intangible assets: Amount written off "balance of consideration for undertakings acquired" ...	700,000	700,000
Profits tax	250,000	Nil
1950: £18,558,043	**21,648,718**	**11,431,592**
Consolidated Net Surplus for the Year 1950: 7,163,236	**6,327,177**	**2,635,191**
Balance brought forward from previous year ...	3,633,842	—
1950: £8,208,069	**9,961,019**	—
Deduct:		
Transfer to taxation reserve	3,500,000	131,000
Contributions to Central Reserve Fund	1,649,946	1,300,000
Adjustment between B.E.A and N.E.E.B.	—	284,994
1950: £4,574,227	**5,149,946**	**1,715,994**
Balance carried to balance sheet: 1950: £3,633,842	**4,811,073**	**919,197**

Personnel . . .

NUMBERS employed show a slower rate of growth than in the interval between the first and second reports, the increase being only 3·5% (5,716) as against the previous 9%. The Authority now employs 45,839 (26%) and Area Boards 130,361 (74%) of the total figure of 176,200. These percentages remaining unchanged, and from Appendix 41 it is seen that of the Authority's total, 1,726 are employed at headquarters. Of the grand total of 176,200 employed in the supply industry, engineering, administrative and clerical grades account for 56,429, or 32%, the remaining 119,771 being graded as manual workers.

The negotiating machinery for the various grades is briefly referred to, and an account of its working during the year is given. This includes the retaining of any pre-vesting rates and holiday conditions for meter readers, the decision in the Tir John and Coventry disputes and the decision not to abolish the category of jointer Class II. Wages of grades in Schedule A to the national agreement were increased by 1½d. per hour from January 29. This increase was also granted to building operatives falling under Clause 21 of the national agreement.

The new salary agreements for technical staff involved detailed consideration of local staffing arrangements throughout the country, but this was successfully completed by the end of the

year except for the London Board and the North of Scotland H.E. Board, and for a number of individual cases which were being considered by a special sub-committee. Other items dealt with, or under consideration, by the National Board were new agreements in respect to draughtsmen and chemists, car allowances, travelling and removal expenses, maternity leave for women employees, and expenses of candidates for employment. It was agreed to continue co-partnership and similar pre-vesting bonus payments for another year.

For administrative and clerical grades the new scheme of salaries came into effect, and attention was given to a number of borderline cases, in particular of commercial staff whose duties were partly engineering. Discussions continued with N.A.L.G.O., the E.P.E.A., and the A.M.E.E., regarding those in managerial or higher executive positions who were outside the scope of the N.J.B. or the N.J.C.

The year covered by the report was the first year of full operation of the joint consultation machinery, and it is interesting to note that district councils and their standing committees dealt with 1,806 items during the year. Courses were held at Buxton and Horsley for members of each local committee.

Safety

The importance attached to safety can be gathered from the fact that regional safety officers visited 400 power stations. The report details many of the items evolved during the year, including parachute type harness for coal bunker work, a new type of linesman's safety belt, asbestos spats and leggings for hot ash protection and improved designs of test lamps, in addition to new designs of pourers for hot compound and 110 V portable tools.

Fatal accidents total 24, of which 4 were B.E.A., 8 contractors' men and 12 from Area Boards—slightly less than last year's total of 27. Accidents involving more than three days, absence were higher, totalling 5,851 against last year's 4,833. Of the former figure, 2,032 were B.E.A. employees and 3,819 Area Boards. As in former years, electricity was a minor cause of accidents (1% Divisions, 3·4% Area Boards). The accident frequency in the Divisions (2·49 per 100,000 man-hours) is slightly less than last year's figures.

Health and Welfare

Of special interest are the efforts of the Southern D.J.I.C. in the rehabilitation of employees suffering from tuberculosis, together with two special investigations into the effect of dust on the lung at power stations and the existence and severity of mercury poisoning in meter repair shops. The Ambulance Centre membership (approx. 1,000 members at the time of the last report) is now 2,400 with 150 associate members. More than 1,400 first-aid certificates have been issued.

Rate of expansion has declined from 9% to 3½%. . . . Total employees now 176,200 —119,771 being manual workers. . . . Women workers increased from 11 to 11½%. . . . Fatal accidents slightly lower (24 as against 27), but lost-time accidents are higher (5,851 against 4,833). . . . Graduate training scheme now totals 927. . . . Improved canteen facilities

Under the heading of welfare and amenities, the report details a number of investigations and actions, ranging from the supply of towels, to the extension of canteen facilities. More than one-third increase is reported in the number of employees taking main meals in a survey of 30 representative canteens.

The re-alignment of sports and social clubs continued, and leagues have grown up for indoor and outdoor games, inter-station, inter-district, and even inter-area competitions have been popular. Thirty-one local arts and crafts exhibitions were held, attracting more than 11,000 entries, from which 1,700 were selected for display at a National exhibition in London.

Welfare officers, in addition to their normal duties, provided guidance in connection with housing problems, and other items of a family or personal nature.

Education and Training

Graduate trainees accepted during the year totalled 283, making a total of 927 since the scheme started, and a six-month extension has now been provided for basic workshop training for those leaving college without practical training. Arrangements were made with a further 11 engineering manufacturers to accept trainees for periods up to six months.

Other activities under this heading included the progress of the scheme for craft and student apprentices, the educational incentive scheme, trainees from overseas, and educational courses. These latter included 4-day and 12-day courses at Buxton and Horsley Towers, also induction courses for newly-joined staff. Two summer schools were also held at Magdalen College, Oxford, for 130 members and chief officers.

Administration . . .

THIS section differs from the corresponding item in the last report in there being fewer major changes to record. The aim of housing the headquarters staff in a single building has not yet been realised, and administration from Gt. Portland Street, engineering, contracts and accounting at Winsley Street, and commercial and labour relations and welfare at Trafalgar Buildings remain unchanged. Ownership of transmission lines, agreement upon which was reached at the time of the last report, is now complete.

Close contact has been maintained with other bodies associated with the supply industry such as E.R.A., E.A.W., E.I.B.A. and the B.E.P.C., also the Coal Utilisation Research Association and the B.S.I. During the year the Authority and Area Boards became members of the National Smoke Abatement Society. Overseas, an active part was maintained with C.I.G.R.E., the World Power Conference and many other bodies. In addition, members of technical and non-technical staffs paid visits to several European countries and the U.S.A. The report of the two productivity teams which visited the U.S. in late 1949 to study generation, transmission and distribution problems was also issued during the year.

Relations with manufacturers included discussions on price questions and an agreement on principle of investigations into manufacturing costs, and activities of joint committees with the C.M.A. on the standardisation of jointing accessories and with the Water-tube Boilermakers' Association on specifications for boilers and boiler trials.

On general matters, it is pointed out that no directives were issued to the B.E.A. by the Ministry or by the B.E.A. to Area Boards. No action was taken regarding representations made by the Eastern Consultative Council regarding retail tariffs and by the Midlands Council on bulk tariffs.

The section includes also details of variations in areas, bulk supply, and approval of certain constructional schemes of the North of Scotland Hydro-Electric Board.

Finance . . .

THE surplus made by the B.E.A. and area boards continues to be on the conservative side, and this year's figure of £6·33 million, which shows a fall of £0·83 million on last year, still remains a modest effort on a £700 million organisation. To avoid possible confusion, however, it should be stressed that this figure is arrived at after deducting interest and is therefore not to be compared with the figure for net profits given in ordinary company accounts.

The story of the report is one of all-round rising costs, caused by increasing wages and prices of materials. Yet, despite this, and without any serious reduction in the surplus, the average revenue per unit has fallen from 1·2d. to 1·181d., and this has been due to the greater increase in consumption under two-part tariffs. Costs increased more rapidly than revenue, and the cost per unit of electricity rose from 0·549d. to 0·557d., largely due to fuel. On the other hand, other heads of expenditure showed a fall in cost per unit due to the totals rising to a lesser extent than electricity consumption.

Administration and general expenses rose by 9·6% to £27·2 millions, and this includes an increase of £900,000 for training, safety and welfare. Capital charges again absorbed 24½%.

Table 9 –Financial Results of each Area Board

Area Board	Trading Revenue	Net Revenue from Trading	Other Income	Interest, Financing Expenses, Profits Tax, etc.	Net Revenue	*Net Revenue*, 1948/49	Transfers to*		Carried Forward
							Taxation Reserve	Central Reserve Fund	
	£	£	£	£	£	£	£	£	£
London	30,372,477	2,098,818	155,483	1,184,365	1,069,936	1,901,090	683,000	157,000	1,422,750
South Eastern	15,305,596	824,044	116,920	746,379	194,584	422,623	255,000	—	97,989
Southern ...	18,019,017	1,562,697	91,059	871,062	782,694	920,223	474,000	100,000	521,298
South Western	8,371,159	450,871	49,932	576,897	—76,094	784	8,003	—76,034	—113,703
Eastern	22,948,485	1,040,250	247,645	1,192,243	95,652	434,183	123,000	—	51,586
East Midlands...	17,078,615	1,216,156	66,510	906,172	376,494	872,539	368,000	91,000	222,081
Midlands ...	22,533,001	878,305	120,290	1,014,284	—15,680	637,382	246,000	—15,680	230,320
South Wales ...	10,469,855	621,742	20,642	400,727	241,657	451,051	161,000	55,000	202,633
M. & N. Wales...	14,222,718	727,710	68,389	496,575	299,524	359,345	166,000	75,000	157,555
Yorkshire ...	20,644,813	1,455,979	80,623	884,140	652,462	1,330,687	310,000	110,000	568,772
North Eastern...	13,154,101	617,768	39,237	566,821	90,184	528,772	269,000	70,000	282,564†
North Western	24,774,885	865,819	112,751	1,116,757	—138,187	617,539	113,000	—138,187	142,620
S.E. Scotland ...	5,122,228	434,282	15,810	225,249	224,843	466,939	173,000	28,000	107,670
S.W. Scotland...	11,190,274	257,998	19,724	383,815	—106,093	153,852	20,000	—106,093	108,458
Totals	233,118,429	13,052,439	1,205,033	10,565,486	3,691,986	9,157,009	3,369,000	339,946	3,891,876‡

* *From the revenue plus last year's balance brought forward.*
† *Includes £284,994 adjustment from B.E.A. for waste heat supplies, 1948/50.*
‡ *Excluding Inter-Board bulk supplies.*

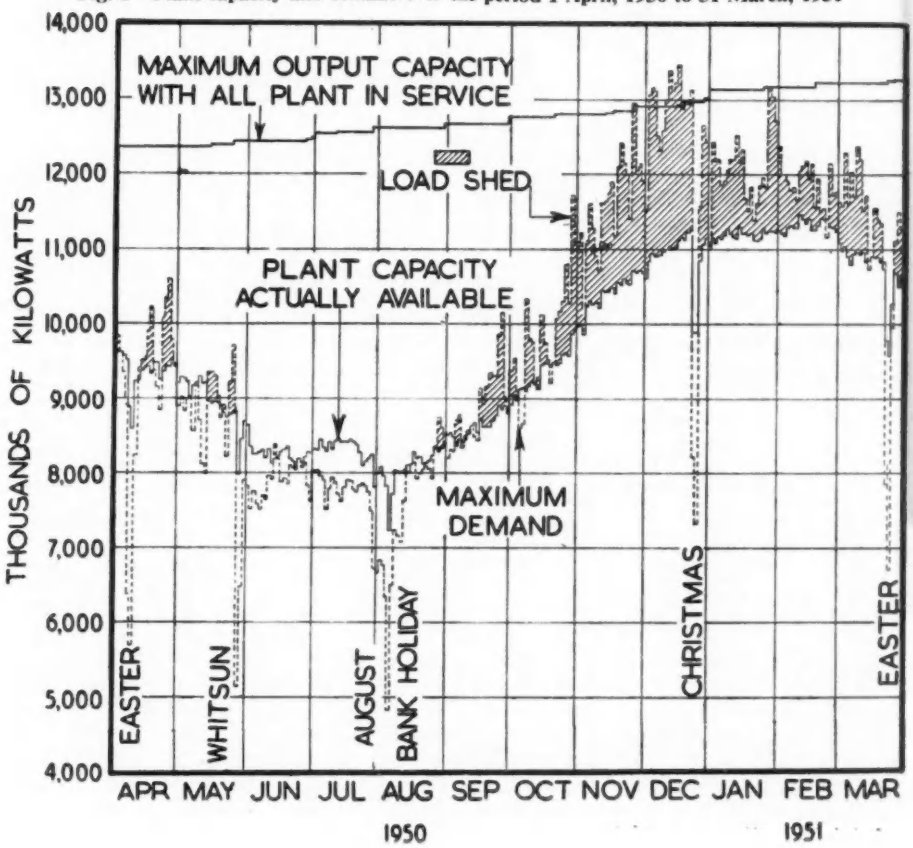
of the combined revenues, and it is notable that the average rate of interest on borrowings has risen from 3·036% to 3·126%. The allocation among the area boards of the payment in lieu of rates continues to be a thorny subject. While the allocations between the Central Authority and the boards has been based on fixed assets, the sub-division of the sum amongst area boards has been on the basis of average surpluses for the two preceding years. The last word on the subject has yet to be said, and the Authority has now referred the matter to two independent advisers.

Finance.—Surplus of £6·3 million was £0·8 million down on last year, but additional £3·7 million for taxation. Four Area Boards showed deficits, reimbursed by B.E.A. Capital expenditure was £121·3 million, £19·3 million over estimates

Taxation

A new feature of the accounts is the provision for taxation. Liability for profits tax was foreseen in last year's report, and a sum of £250,000 has been included for this item. However, the announcement by the Chancellor that initial allowances for new plant in respect of income tax will be discontinued after March 1952, has placed the B.E.A. in serious difficulty. This 40% tax allowance, combined with the straight-line methods of depreciation, provided relief for the present at the expense of the future. The change in taxation will not become effective until the year 1953-54, and even then it is reported that, although profits tax will arise, income tax liability may be deferred for some years beyond that. Accordingly a tax reserve of £3·5 million has been set up, apportioned amongst the boards in relation to the

Fig. 1—Plant capacity and demand over the period 1 April, 1950 to 31 March, 1951



notional liability of each. It is stated that this amount substantially exceeds the amount of the taxation provision normally appropriate to the year's surplus if there had been no initial allowances.

The B.E.A. raised their kilowatt charge by 5s. on April 1, 1950, and as a concession to area boards, to avoid the necessity for interim alterations in tariffs, they guaranteed to reimburse an area board's deficits attributable to this cause. Amounts totalling £336,050 were paid to four boards under this assurance.

Capital Investment

Capital expenditure during the calender year 1950 attributable to "expenditure" was £121·3 millions, which can be compared with the figure of £102 millions given in the Economic Survey for 1950. In the autumn of 1951 the Authority submitted the following estimates.

	1951 (*estimated*) £ *millions*	1950 (*actual*) £ *millions*
Generation	70	67·0
Main transmission ..	10	6·7
Distribution	50	45·6
Building repairs and maintenance ..	3	2·0
	133	121·3

In the Economic Survey for 1951, no indication was given of the total capital allocation to the industry, but in June the Chancellor of the Exchequer stated that the capital investment in the case of electricity would be substantially higher.

The subsequent passages in this section of the report relate specifically to the Central Authority and area boards accounts, the principal features of which are shown in the accompanying tables.

The Minister's Report

THE Minister of Fuel and Power's report is brief and largely formal in character. Under Part I (Applications to and proceedings of the Minister), consent to four new generating stations and 25 extensions are noted totalling 2,557 MW. Overhead line consents totalled 7,607, of which 13 necessitated a hearing of the local authority. Twenty-four applications for wayleaves with 12 outstanding from the previous year resulted in 17 consents, 8 refusals, 6 withdrawals and 5 still outstanding.

Under the 1937 Act, consent was given to the N.W. Board to apply protective multiple earthing in two cases. Overhead line regulations were relaxed in several cases and approval was given to certain schemes comprising h.v. and l.v. conductors on the same pole. Notices were served and regulations prescribed in 32 cases affecting non-statutory undertakings.

Part II

Proceedings under the 1947 Act included a number of re-appointments to Area Boards of part-time members. Steps were also taken to bring the membership of Consultative Councils to the statutory maximum of 30 per council.

On the capital investment question it was decided that the programme should provide for 1,550 MW of new plant in 1955. Curtailment of distribution programme was stated to be inevitable.

The remainder of the report deals with variation of areas and confirmation of compulsory purchase orders.

Table 10—Analysis of Units Sold under Various Tariffs by the Area Boards and the Central Authority
(Thousands of Units)

	Flat Rates		Two-part								
	Lighting	Heating, Cooking Water Heating & Small Power	Domestic	Commercial	Farming Tariffs	Large Power	Public Lighting	Traction	Total (Excluding Inter-Board Sales)	Sales to Other Area Boards	Total Sales by Area Boards
Area Boards											
London	244,947	322,693	1,651,124	644,543	338	1,390,391	79,072	94,063	4,427,171	99,145	4,526,316
S.E.	78,457	239,195	1,135,149	240,459	5,192	646,415	29,884	23,899	2,398,650	73,221	2,471,871
S.	82,279	248,224	1,079,383	306,485	17,019	1,025,712	24,343	16,152	2,799,597	69,325	2,868,922
S.W.	60,123	183,904	620,009	113,741	5,083	389,620	14,115	—	1,386,595	—	1,386,595
E.	87,488	315,116	1,674,733	299,295	25,573	1,453,218	32,846	134,357	4,022,626	42,179	4,064,805
E. Midlands ...	134,812	196,896	1,025,507	161,812	42,128	1,941,410	21,305	25,845	3,549,715	328	3,550,043
Midlands ...	190,655	405,135	1,233,922	83,329	16,483	2,915,197	22,965	46,399	4,914,085	19,100	4,933,185
S. Wales ...	76,331	226,386	292,852	25,296	6,767	2,008,660	17,165	10,714	2,664,171	490	2,664,661
M. & N. Wales ...	122,086	186,443	728,101	144,439	—	1,760,697	19,282	88,859	3,049,907	—	3,049,907
Yorkshire ...	200,556	343,944	1,155,305	96,239	8,911	2,823,458	32,571	126,692	4,787,676	1	4,787,677
N.E.	139,700	120,289	513,674	145,231	12,666	2,020,174	19,126	93,446	3,064,306	3,589	3,067,895
N.W.	207,536	390,767	1,471,328	173,110	12,668	2,887,713	46,247	66,345	5,255,714	11,864	5,267,578
S.E. Scotland ...	34,624	63,413	321,103	83,539	11,061	442,803	14,933	34,031	1,005,507	—	1,005,507
S.W. Scotland ...	15,656	65,079	776,203	343,206	17,025	1,295,368	41,499	—	2,554,036	—	2,554,036
Total Area Bds.	1,675,250	3,307,484	13,678,393	2,860,724	180,914	23,000,836	415,353	760,802	45,879,756	319,242	—
B.E.A. Sales to Railway Undertakers	—	—	—	—	—	—	—	704,853	704,853	—	—
TOTAL	1,675,250	3,307,484	13,678,393	2,860,724	180,914	23,000,836	415,353	1,465,655	46,584,609	—	—

AREA BOARD PROGRESS

Capital Restrictions hold back Expansion

CRAMPING effects of capital expenditure restrictions are a common object of complaint in the fourteen area board reports which were published at the same time as the main B.E.A. report. In the following paragraphs the principal points from these reports are summarised while the table sets out the leading engineering statistics.

London

The urgent need for the reinforcement of the higher voltage distribution system again dominated the Board's engineering work. For the period 1951-52 it is estimated that some £17,400,000 will have to be spent on systems up to 11kV and about £17,900,000 for the higher voltage transmission system and associated bulk supply substations. During the year 159,416 kVA of transforming plant operating up to 11 kV was put into commission together with 81,000 kVA for pressures between 22 kV and 66 kV. There are already 31 major constructional projects in hand or in an advanced stage of planning. On the commercial side, a further 39,061 consumers were connected, bringing the total to 1,605,555. Of the increase, 33,795 were domestic. Unit sales, at 4,427 millions, showed a rise of 13·01%—above the average—and domestic sales were 14·6% up. The surplus on contracting and sales of fittings this year amounted to £63,904, and the sum outstanding on h.p. and deferred payment instalments not yet due was £769,420, as compared with £435,148.

South Eastern

With 13,000 agricultural holdings of over 5 acres in extent within its boundary, this Board now claims that not less than 55% of all farms in the area had a supply at March 31 last. Connections last year totalled 477. The cutting of capital expenditure has caused the Board to suspend simple hire of new apparatus (where this still applied) to avoid outlay on appliances. But expansion of hire purchase in large degree accounts for the increase in the value of showroom sales to £1,181,932 compared with £844,732 last year. The comprehensive forward plan for electrical development of the area has been completed. It assumes that during the next 10 to 15 years the number of consumers will increase from 950,000 to 1,250,000, and with these requiring 1½ kW each at the time of system maximum demand, the prospective total demand is 2,000 MW—nearly three times the present figure. The plan will cost about £30 million, but most of the work would be devoted to reinforcement of the existing system, for there are no considerable areas where a supply is not already available.

Southern

This Board connected 40,755 more consumers, including 1,513 farms, in 1950-51, bringing its total to 998,706. Of the £4,500,000 of capital authorised by the Board during the year about £4,155,000 was in respect of engineering work. The largest of the schemes, to cost £262,000, is for the extension of the 33kV system recently established at Bournemouth. Work completed in the year amounted to 440 miles of h.v. mains and 372 miles of l.t. mains, plus 168,356 kVA of transformer capacity. During the year domestic consumption, at an average price of 1·52d per unit, increased by 15·8%, while supplies to farms, at an average of 1·40d per unit rose by 35·5%. In the Board's Proving House 194 appliances were tested, of which 64 were subsequently modified by the makers, in line with suggestions. Due to the necessity for restricting capital investment only 964 d.c. consumers were changed to a.c.

Area Board Commercial and Engineering Statistics, 1949-50

	Consumers at March, 1951 ('000)	Increase during year ('000)	Net max. demand (MW)	Max. demand, 1950 (MW)	Average load factor %	Increase in circuit length of h.v. mains	Increase in circuit length of l.t. mains	Consumers changed to standard a.c. system
						miles	miles	
London	1,606	39	1,474	1,393	39·6	117	112	7,449
South Eastern ...	957	32	741	674	42·9	161	216	4,271
Southern ...	999	41	832	767	44·2	333	369	3,366
South Western ...	577	25	435	414	42·1	288	256	1,115
Eastern	1,339	54	1,169	1,078	44·6	434	506	13,360
E. Midlands ...	1,000	32	987	923	46·1	518	431	6,649
Midlands... ...	1,060	46	1,357	1,258	45·5	346	347	14,392
South Wales ...	475	15	580	538	57·1	122	126	118,901
M. & N. Wales ...	704	25	715	684	53·6	168	112	3,308
Yorkshire ...	1,192	38	1,249	1,187	48·0	251	306	2,756
North Eastern ...	757	26	746	675	52·0	254	147	6,136
North Western ...	1,373	35	1,508	1,396	44·4	1,574	244	2,357
S.E. Scotland ...	334	19	267	248	47·9	238	125	1,217
S.W. Scotland ...	685	23	672	644	47·4	175	263	7,658

South Western

A further 25,495 consumers were added during the year—over 1,600 more than in the previous period. The most marked advance was again in the number of farms and other rural premises connected, but over 8,500 new houses were also given a supply. There was again a considerable increase in the engineering work carried out—some 544 circuit miles of mains were added to the system as against 363 miles in the previous year. Work has started on the primary network, costing £300,000, to provide a new mains system for the devastated centre of Plymouth. The Central Construction Department, formed to deal primarily with major extensions, has proved a source of considerable saving. During the year a total of 930 consumers, previously receiving supplies from the non-statutory undertakings of Polruan, Colyton and Chulmleigh were connected to the Board's system.

Eastern

In spite of capital expenditure cuts and material shortages 54,428 new consumers were connected, making the total 1,339,270—an increase in the past three years of 13·5%. Units sold also rose by 13·7%, and, although fearing a deficit when making earlier proposals to increase charges, the Board is left with a net surplus of £95,652 for the year. With several new towns in the area a considerable amount of system planning has been necessary, but in regard to Basildon, Welwyn and Hatfield, no further development has been undertaken. But many extensions of h.v. and l.v. systems have been carried out to supply housing schemes, notably L.C.C. estates, involving some 20,400 houses. In addition supplies were made available to 181 villages and 1,149 farms, bringing the total of the latter to 13,853.

East Midlands

This Board has connected its millionth consumer. A further 31,679 were added, bringing the total to 1,000,165, and of the increase, 1,197 were farms. Preliminary surveys are being carried out with a view to introducing standard tariffs for industrial, commercial and farm supplies. A standard hire scheme for 10 gallon washboilers has proved successful and in eight months 2,745 were installed. Approval has been given for a further bulk supply point at Kibworth, Leics, where the 132 kV Leicester-Corby line is in close proximity to the Board's 66/33 kV substation. In its supply from the Renishaw Iron Co., the Board purchased 7,695,000 units at an average of 0·333d p.u. A reorganization, completed last March, reduced the number of sub areas from nine to eight by amalgamating Derby and Burton sub areas.

Midlands

An experimental station has been set up by the Board for the testing of American high speed reclosers for rural h.v. systems, a number having been purchased from the U.S.A. There is co-operation with British manufacturers too, for the development of similar equipment in this country. In a far seeing plan for standardisation of the system of supply, arrangements have been discussed with the Ministry of Fuel and Power for complete consent to change over of all non-standard voltages in the area on the understanding that such work is limited to that essential for improving supplies or operation of the system. As a trial of a new type, about 10,000 yards of aluminium sheathed 33kV impregnated gas pressure cable was laid in Birmingham.

South Wales

Two new bulk supply points were connected during the year, and the maximum demand on the system increased by 8%. Of the total demand on the system, 5% was met by the operation of private generating sets. Co-ordination of h.v. system control at two centres was completed during the year, and there was continued progress in the concentration of specialist services at sub-area level. System reinforcement at 66 and 33 kV was pressed forward as a matter of urgency, but capital restrictions made work on rural electrification largely impossible.

In the Western sub-area a block tariff on a room basis was introduced. All unit charges under 3d., for tariffs not affected by a coal cost clause, were increased by one-tenth of a penny. Six new service centres were opened.

Merseyside and N. Wales

Capital available during the year was 24% less than the Board considered necessary. The effect of capital cuts fell particularly heavily on rural electrification. System reinforcement was continued, though by some re-arrangement the number of bulk supply points was reduced from 13 to 12. Much of the 20 kV system was changed to 33 kV.

No changes were made in published tariffs during the year. Two new service centres were opened, and there was increased use of automatic switching by injected voltages, to remove water-heater loads at peak periods. Hiring facilities were curtailed, but there was a one-third increase in contracting and the sale of fittings.

Yorkshire

Estimated capital requirements of £6·7 million for the year had to be reduced to £4·6 million. There was urgent need for reinforcement of the distribution system, not all of which could be carried out. The policy of decentralising the engineering department was completed without disturbance. One new bulk supply point was brought into operation during the year, making the total number 22.

Proposals for a new block tariff were submitted to the consultative council, but by the end of the year under review, agreement had not been reached in this matter. With reference to consumers' installations, the Board prepared a code of minimum tests and inspection for domestic electrical installations. Rural development was reduced by restrictions on capital expenditure.

North Eastern

During the year the number of engineering districts was reduced from 39 to 38. Good progress was made in strengthening the 66 kV system, and especially in replacing circuit-breakers which had inadequate breaking capacity. Progress is also reported on reinforcement of low-voltage networks and in supplies to housing estates.

There were no tariff changes during the year, but new tariffs were prepared and publicised. Forty-one rural villages and hamlets were connected to the Board's system. Sales of electrical apparatus from service centres increased by 35% on the previous year, but contracting activities were still confined to those districts where such facilities existed before vesting day.

North Western

An area report centre for the transmission and distribution systems was established during the year, and is now manned continuously. Load shedding operations took up the time of staff to the point where difficulties were experienced in the maintenance of equipment. Long-term planning for system reinforcement includes 12 major schemes which were put into operation during the year, and which are estimated to cost £1·6 million. A design of 33 kV line of unearthed construction has been developed, and construction commenced.

Tariff revisions to take effect at the end of the year were announced, these being mainly adjustments of existing tariffs A block tariff is to be introduced, based on rooms, to replace existing two-part tariffs. Five new service centres were opened during the year.

S.E. Scotland

Disagreement with the Central Authority over payments in lieu of taxes is noted in the report. Progress was made with a scheme to bring 132 kV grid supplies into the City of Edinburgh.

A new tariff for supplies to farms and other isolated premises was introduced during the year. In continuation of efforts to improve standard of service to consumers, house-to-house visits were made to advise domestic consumers in the most economical use of electrical appliances. Experiments are being conducted in the use of floor heating by electrical means.

S.W. Scotland

One new temporary supply point was established during the year, and other work on general system development was carried out. A scheme for the change-over of consumers in Paisley to standard voltages was prepared and approved. Specifications were issued for several standard designs of 11 kV and low-voltage overhead lines.

Five new service centres were opened, one to replace inadequate premises in the same locality. A standard domestic tariff was brought into operation to replace 50 different existing tariffs, and a standard farming tariff was also introduced. Arrangements were subsequently made to increase the running charge in these tariffs to meet new coal costs.

R.F. Heating Speeds Block-Board Production

RADIO frequency heating of glue, used for some years in the woodworking industry, has now been applied to the manufacture of block-board and similar products, by a new unit jointly developed by Fielding and Platt Ltd. of Atlas Works, Gloucester, and General Electric Co. Ltd.

Block-board is made from strips, in the form of battens or offcuts of various widths but the same thickness, by edge glueing, pressing together, and curing the glue. With r.f. heating, curing times are considerably reduced since owing to the difference in loss factors between timber and glue, the heat is developed within the glue itself, not wasted in heating up the general mass of the wood.

The unit consists of a pneumatic press with feed table and automatic loader, a glue spreader and a 5 kW G.E.C. r.f. generator supplying power through a matching unit. A built-in compressor and air reservoir are provided for press operation.

Two operators only are required, the first feeding strips into the glue spreader and stacking the completed panels. The second operator assembles the glued strips on the machine feed table, which has a stainless steel surface and is provided with stops for laying up the strips. The assembly is carried into the press by an automatic loader arm, the cycle of curing and ejecting being automatic.

By this means up to 20 sq. ft. of block-board can be produced in a few minutes, actual production rates being determined by the size, moisture content, and the type of glue used. The capacity of the press is from 36-80 in. long, up to 40 in. wide and from $\frac{5}{8}$ to 2 in. thick.

Illustration shows a typical finished board being ejected from the machine

Our readers' views . . .

One-Sided Conference

THE writer was instructed to accept an invitation to a conference on meeting the fuel and power shortages, which was sponsored by the Combustion Engineering Association and held at the Dorchester Hotel on the 9th and 10th of this month.

The British Electricity Authority was condemned outright for being unco-operative and being concerned only with their own development and with a complete disregard for the national interest. More particularly as it affects ourselves it was concluded that electricity has no place except for the provision of industrial power and domestic lighting. The use of electricity for domestic space and water heating was described as "calamitous." We do not hold a brief for space heating but on heating water the various speakers demonstrated a bias equal only to their ignorance of the value of the water heating load.

We were concerned and very distressed that the B.E.A. had not considered it worthwhile being represented at the second day of this conference. As a representative of a small section only of the industry and in spite of our rising indignation, we did not consider it proper that we should address the conference even on our own behalf, and we waited until too late, hoping that the Authority would speak for themselves and us. The chairman has since expressed his regret that time did not permit his granting our personal request to make a statement, this request being made only after we had despaired of the B.E.A.

A. J. Wyndham Roberts

SANTON LTD.

COMPARED with the daily papers, your brief report in your October 11 issue of the Minister of Fuel and Power's comments on electric fires to the Combustion Engineering Association showed considerable restraint. I was not able to be present at the meeting, but from newspaper reports and conversations with those who were, the entire body seems to have adopted an attitude completely devoid of realism. Until domestic solid fuel is no longer either unobtainable or non-inflammable, the public will use electric fires which for short-term heating are even more economical in fuel consumption than solid fuel appliances, and unless the Minister is considering legislation making their possession a penal offence, I do not see how he is going to implement his brave words.

"Frigid"

LONDON

◆ ◆ ◆

Direct Earthing and Water Mains

ALL will agree with Mr. A. E. Croft in his recommendation for checking the complete earth loop resistance, but he does not go nearly far enough in his appraisal of the present position.

In 1947 the E.R.A. investigated the resistance of asbestos-cement water mains, and the Report V/T101 contained details of conditions as found in Manchester and Rochdale. The only part of this report to which I need refer is that dealing with the resistances of the gas services into various houses, which were almost invariably lower than those of the water services and the service cable sheaths.

Now in any house in which the water service is connected to a cement-asbestos main and water heating equipment operated by gas exists, the water and gas services will be in metallic connection at such equipment. With the gas service pipes exhibiting resistances of the order 0.27 ohm to 0.9 ohm, the highest recorded, a loop test will give entirely misleading readings, as the gas and water services are in parallel. Any installation engineer finding his loop test to be in the region of one ohm, measured from the water service pipe, will feel justified in making his earth connection to such pipe, and he will have the support of Regulations in so doing. In effect, however, he is earthing to the gas service, with all that this implies.

The present position regarding direct earthing is involved and difficult, and no quick check will reveal the true position. The writer has long ago reached the conclusion that for the domestic installation the only answer to the problem is complete insulation. Where this is not possible, the use of voltage-responsive equipment is essential, but by now direct earthing should have become completely discredited.

T. C. Gilbert

FOLKESTONE M.I.E.E.

Small Motors—

No. 3. D.C. & SYNCHRONOUS MOTORS

A review of the characteristics, construction and application of these f.h.p. machines

by J. L. WATTS, A.M.I.E.E.

DIRECT current motors form only a small proportion of the fractional horse-power motors in use at present, although there are an appreciable number operating on voltages up to 250 volts. The field system of the d.c. motor is usually of the two-pole type, and may be of solid metal.

The torque of a d.c. motor is proportional to the product of magnetic field strength and armature current, whilst the speed is practically proportional to the armature voltage and inversely proportional to the magnetic field strength. Direct-current motors may be of the series, shunt or compound types. As shown in Fig. 1 the starting torque of a series motor is considerable when switched direct on line at starting, whilst the total fall of speed from no load to full load is high. The motor is unsuitable for use on a drive which may become unloaded because of the high speed which may be reached under these conditions. These motors are, however, suitable for fans, certain lifting appliances, etc. The speed of the series motor may be reduced by means of a resistance in series with the motor, or in parallel with the armature; or may be raised somewhat by connecting a diverter resistance across the field coils.

Shunt and Compound Motors

The speed variation of the shunt motor on a varying load is quite small, as indicated in Fig. 1. Thus this motor is suitable for the majority of constant-speed drives which do not need a very high starting torque. The speed of the shunt motor can be reduced by means of a resistance in series with the armature, or increased by means of a resistance in series with the shunt field windings to reduce the field current and magnetic field strength. With shunt field control the speed variation on varying load is little changed.

Compound motors, having both a series and a shunt field winding on each pole, are also fairly common in fractional horse-power sizes. The two sets of windings are generally connected so that they assist each other, in which case the starting torque, and torque at low speeds, will be greater than in the case of a shunt motor of the same size and speed. The speed variation of the compound motor on a varying load is generally greater than in the case of a shunt motor. Compound motors are suitable for use with such apparatus as compressors, which require a fairly high starting torque. They are also suitable for machines which require a series characteristic without the series propensity for running away on no load; this characteristic is obtainable in a motor having a strong series winding and a comparatively weak shunt winding. The characteristics of compound motors depend considerably on the ratio of the series and shunt field ampere-turns. The speed of the compound motor may be varied in the same way as that of the shunt motor. The speed of a d.c. motor may also be controlled by varying the voltage applied to the motor or its armature.

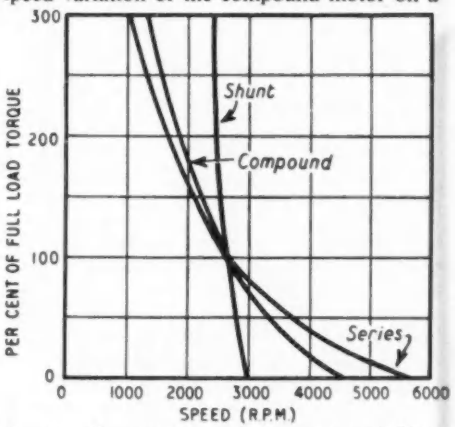


Fig. 1. Characteristics of three types of f.h.p. direct current motor

Starting and Reversal

The starting torque obtainable from a given d.c. motor when switched direct on line depends, amongst other things, on the size of the motor. A typical $\frac{1}{3}$ h.p. compound motor

may develop in the region of 4½ times full-load torque with about 4 times full-load current under these conditions. Usually, however, d.c. motors over ¼ to ½ h.p. are started up with a starting resistance in the armature circuit to reduce the starting current, and consequently the starting torque also.

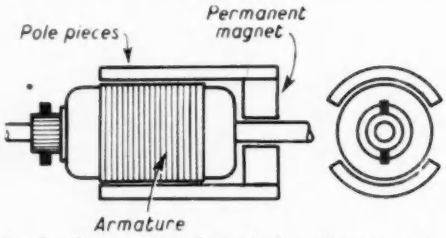


Fig. 2. Construction of a typical small permanent-magnet type motor

All d.c. motors can be reversed by reversing the current through either the armature or the field windings. In order to avoid sparking at the brushes, and to obtain the same speed-torque characteristics, in the new direction, it may be necessary to move the brushes slightly backward in the opposite direction to the new rotation after reversal. A double-pole, two-way switch may be used to reverse any d.c. motor. Alternatively a single-pole, two-way switch may be used for this purpose in conjunction with a special series motor which has a split series field winding, the two halves of which are designed to create magnetic fields of opposite magnetic polarity.

In order to avoid the need for moving the brushes after reversal, motors which are intended for reversing duty, other than small machines, are often provided with interpoles, which are narrow poles fitted between the main poles and wound with coils which are connected in series with the armature. The purpose of the interpoles, of course, is to neutralise the armature magnetic field in the neutral zone and to provide a commutating field which assists in causing quick reversal of the current in the armature coils as they are short-circuited during commutation. This enables the brushes to be kept in the neutral position for either direction of rotation. When reversing a motor provided with interpoles the interpoles and armature should be treated as one unit; the connection between the armature and interpole coils should only be broken and altered if the motor is reversed by moving the brushes round the commutator through one pole pitch.

Recent improvements in permanent magnet alloys have enabled permanent magnets to be used to an increasing extent to provide the field system of small d.c. motors. Since permanent magnet motors require no field coils they can be made quite small, particularly as regards diameter (Fig. 2). The characteristics of the permanent magnet d.c. motor are generally similar to those of a shunt motor. This motor can be reversed by reversing the current to the motor; this is the only type of motor which can be reversed in this way.

Synchronous Motors

The characteristic feature of the synchronous motor is that its speed is absolutely constant on a varying load within its range, provided it is fed from a supply of constant frequency. In fractional horse-power sizes some synchronous motors are required to develop an appreciable torque, whilst others are only required to develop a very low torque for turning such items as clocks, timing devices, etc. The synchronous-reaction motor has a type of rotor which does not provide a uniform magnetic path in all directions, such as the four-pole iron

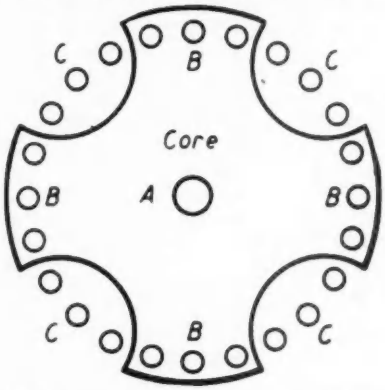


Fig. 3. Diagrammatic section on the type of rotor used in some synchronous-reaction motors

core A of the rotor shown in Fig. 3. The four poles form a magnetic path of low reluctance which tend to line up with the axis of the stator windings and, once started, the rotor tends to be dragged round by the revolving magnetic field created by the supply current in the stator windings. The stator may be similar to that of an induction motor. A plain-shaped rotor of soft iron or permanently magnetised steel with no conductors may be employed in a small non-self-starting synchronous motor. When started by external means the motor will run in whichever direction it is started, the synchronous speed in r.p.m. being equal to

$$\frac{2 \times \text{frequency of supply (cycles per sec.)} \times 60}{\text{No. of poles in stator}}$$

Alternatively the shaped rotor core may be fitted with squirrel-cage conductors as at B in Fig. 3; in some cases the conductors may also be fitted in the spaces between the rotor poles, as at C. A polyphase, split-phase or capacitor type of stator may be used with such a rotor, in which case the motor will be self-starting when switched on. It will start as an induction motor although, as may be seen from Fig. 4, the starting torque will depend somewhat on the position of the rotor poles with respect to the stator poles at the instant of switching on. If the load on the motor does not exceed a certain "pull-in" value, which may be about one-third of the full load torque of the machine as an induction motor, the motor will then pull into synchronism and will run at synchronous speed unless the motor load exceeds a certain "pull-out" torque, greater than the synchronous "pull-in" torque. If the motor load exceeds the synchronous "pull-out" torque it will continue to run as an induction motor at a lower speed. If, however, the load exceeds the peak torque the motor will come to a standstill as in a normal induction motor.

A more uniform starting torque is obtained in some motors by cutting slots in the rotor core below the conductors, instead of in the periphery of the rotor. The synchronous motor has a low starting torque and power factor.

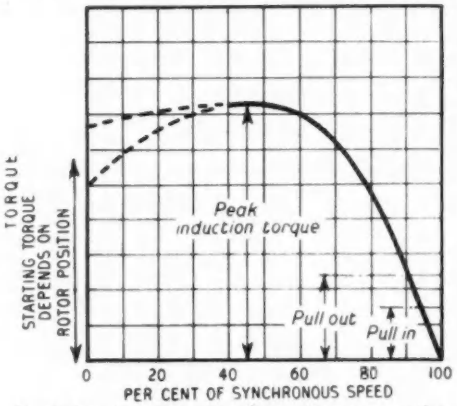


Fig. 4. Speed-torque curve of a synchronous reaction motor

Capacitator-run synchronous motors tend to run with less vibration and noise than do split-phase motors and hence are preferable for many purposes.

Synchronous-repulsion motors are also made. The construction of this machine is similar to that of the repulsion motor with the addition of tappings which are taken to two slip rings from points one pole pitch apart on the armature windings. The brushes on the slip rings may be short circuited or may be fed with direct current. When the external circuit between the slip rings is left open circuited the motor acts as a plain repulsion motor. If the brushes are short circuited the motor will run at synchronous speed within a certain range of load. When the brushes are excited with d.c. the range of load for synchronous operation is

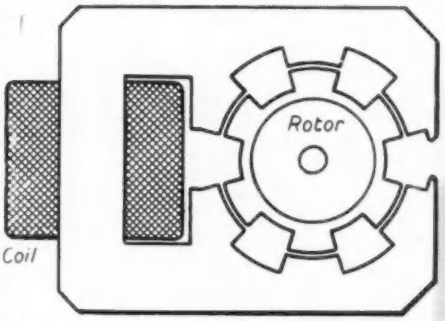


Fig. 5. Arrangement of multi-polar synchronous motor with a single coil

increased, with reduction of a.c. line current and increase of power factor. This machine has been used for driving sound motion picture projectors.

Smaller synchronous motors are generally of rather different construction. They may be self-starting or may have to be started by hand. One type of small synchronous motor consists of a laminated core carrying the primary coil, a portion of each pole face being fitted with shading bands to create a revolving magnetic field so that the motor is self-starting. The rotor system may have three discs of magnet steel in which magnetic poles are created by the stator poles; hysteresis in the steel causes the rotor to retain magnetism after the stator flux has fallen. The magnetic effect causes the rotor to turn in the direction of the revolving stator field. The synchronous speed of the two pole motor on a 50-cycle supply will be 3,000 r.p.m. In a reversible shaded pole motor of this type two rotors may be used on a common shaft, the two rotors being acted upon by shaded pole stators arranged for opposite rotation.

Fig. 5 shows how a single coil is used with a slotted pole face and a slotted rotor core to obtain a multi-pole effect, in order to obtain a comparatively low speed on a given a.c. supply. The synchronous speed of the motor in r.p.m. will be equal to

$$\frac{\text{supply frequency (cycles per sec)} \times 120}{\text{No. of rotor teeth}}$$

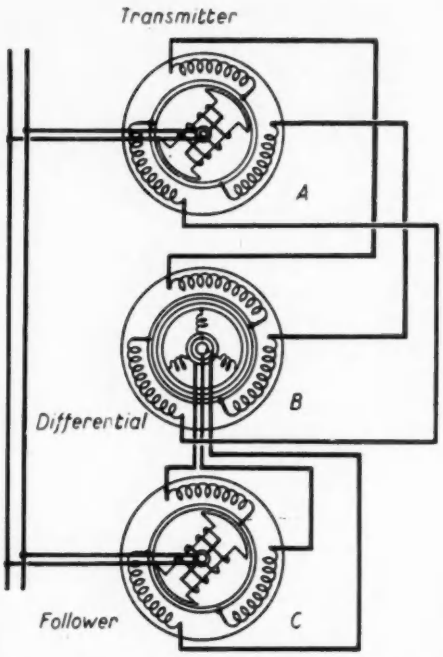


Fig. 6. Connections of differential Selsyn system

This type of rotor, whether of soft iron or permanently magnetised steel, is not self-starting. Such a rotor with permanently magnetised poles may be made self-starting by the addition of a soft iron spider with arms which are arranged to lie between the stator poles when the permanent magnet rotor poles are in line with the stator poles.

Telemotor Systems

Synchronous types of machines are also used in pairs or groups with the object of transmitting motion between the machines for simultaneous control, synchronisation, remote indication, remote control, servo-control of mechanism. These machines have various names, such as Selsyn, Magslip, Step-by-Step motor, Twyntorq, Interlocking, or Synchronous-Torque motor. In transmitting motion the rotor of a master or driver is moved round mechanically and causes electrical impulses which are conducted to the receiver so that the rotor of the latter follows that of the transmitter.

The stators of these machines frequently are fitted with three-phase windings, whilst the rotor is often of the two-pole type as shown at A and C in Fig. 6. If the rotors are only required to make part of a turn they may be fed through flexible leads; if required to make a turn or more they are fed through slip rings. A simple system may consist of the transmitter A with its stator windings connected directly to the stator windings of the receiver C. As indicated in Fig. 7 the torque created in the receiver varies with the angle of displacement between the rotors of the transmitter and the receiver; whilst the lower part of the figure shows how the torque of a typical machine varies with the speed.

The system indicated in Fig. 6 employs a master or transmitter A with a single-phase rotor and a three-phase stator winding. The latter is connected to the three-phase stator winding of a differential machine B, which has a three-phase winding in slots in its cylindrical rotor, the latter being connected to the three-

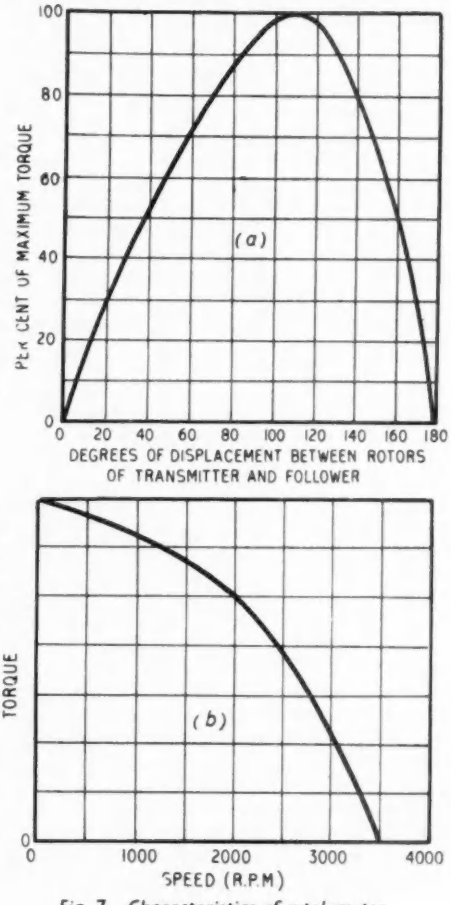


Fig. 7. Characteristics of a telemotor

phase stator windings of the third machine C. The differential thus acts as a transformer between the transmitter A and the follower C. If the rotor of the differential is prevented from turning the transmitter and follower will operate in the normal way; although there may be a relative displacement in the no-torque position, depending on the angular position of the differential. If one of the three units is free to rotate whilst the other two are coupled to different mechanisms the free unit will rotate by an amount which will depend on the algebraic sum of the movements of the units which are coupled to the mechanisms; this arrangement is very suitable for certain purposes such as indicating the difference between two levels.

Telemotors are also used on d.c. systems; the follower may have a three-phase stator winding, whilst the rotor may be of the H type, either wound as in Fig. 6, or unwound. The transmitter or controller used on this system may be a type of commutator which is supplied from d.c. mains. Alternatively, as indicated in Fig. 8, the transmitter may be a potentiometer resistance which alters the connections of the stator windings of the follower with respect to the d.c. supply.

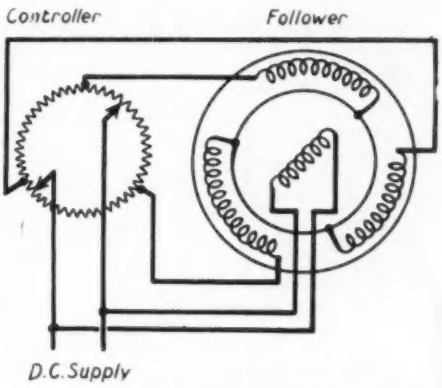


Fig. 8. Connections of d.c. telemotor system

Power for Textile Production

TEXTILE industries in Northern Ireland employ 67,000 people and have an annual product value of £78M. The additional fact that they use 89 million units of electricity every year explains why MR. S. MCCRACKEN had plenty to say about them in his address to the Northern Ireland centre of the I.E.E. Speaking of the general problem of power supply first, he suggested that in spite of a need for process steam, increases in coal cost were making private generation less attractive as against public supply.

For the average size of mill, two 1,250 kVA transformers are sufficient. Conventional arrangements of switchroom are possible, and cables from this to the distribution boards can in general be p.i.l.c., terminated in an isolating switch and a busbar chamber with metal-clad switches with h.r.c. fuses. Various methods of secondary distribution to motors are possible, but Mr. McCracken suggests that mineral insulated cables run in shallow cable trenches make an attractive and relatively inexpensive job.

Power factor correction is of particular importance in textile mills, and most methods will make savings covering their capital cost in from 18 months to three years. A capacitor at the point of supply is the simplest arrangement, but is only available to the smaller consumer. Use of a synchronous induction motor, which offers some advantages of ease of control, is seldom appropriate in textile mills. Local capacitors connected directly across stator terminals of the larger motors on a system have many advantages, especially those of reducing current in feeders and of automatically adjusting the overall correction to take account of load. Where small motors in large numbers are involved, local capacitors of comparatively large capacitance installed at the end of feeders and contactor controlled by a p.f. relay have been used.

Mr. McCracken continued his address with a description of various technical processes involved in the manufacture of textiles, and dwelt on the electrical problems peculiar to each. From these may be picked out his remarks on driving motors for yarn spinning. On the whole, simplicity and ease of maintenance are preferable here to apparent technical advantages which have these characteristics in a lesser degree, and so commutator machines are not so popular as they might be.

Totally enclosed fan-cooled motors are eminently suitable for use where dirt, dust, fluff or fibres might otherwise be drawn inside the machine and choke up the ventilating ducts. They are not suitable for operation in the hot humid atmosphere of a wet spinning room, for with temperature changes, condensation of moisture may occur inside the motor. Double cage s.c. motors have many advantages for textile drives.

The I.E.E. Inaugural Address

Sir John Hacking reviews current developments in generation and transmission

Sir John Hacking

IN presenting his Presidential Address to the Institution of Electrical Engineers last Thursday night, Sir John Hacking dealt with the present state of electricity supply, and gave some details of provision made for the future.

He began by comparing the development of electricity supply in this country with that taking place abroad. The true growth in total supply in Britain between 1939 and 1949 was about 64%, a figure similar to that for Switzerland and not much greater than the figures of 45-50% for the Netherlands, France, Norway and Belgium, though substantially greater than those for Italy and Western Germany. The British 64% was, however, rather less than Sweden's 76% and considerably less than the figure of 117% for the U.S.

Shortly after the end of World War II several of the Western European countries, such as Italy, France and Western Germany, as well as Britain, had serious power deficits amounting to as much as 500-1,500 MW at time of peak load. By the winter of 1950-51 it appeared that in all parts of the mainland of Western Europe—except South Holland—these deficits had been eliminated or reduced to negligible proportions. In Britain, however, the position had grown worse instead of better. There were two principal reasons for this. First, there was the restriction on new generating plant imposed after Dunkirk, and second, many Continental countries bought plant from America under Marshall Aid.

On the question of thermal efficiency, Sir John pointed out that a comparison between a group of 200 American base load stations and 60 roughly comparable British stations in 1947 showed that the thermal efficiency of the U.S. stations was 23·3%, compared with a British figure of 22·4%. The load factor of the American group was much higher, the kW/hr sent out per kW of installed plant being 5,379 in U.S., compared with 3,815 in Britain.

Figures for 1950 were estimated at 23·9% for U.S. against 21·5% for Britain, showing that the improvement in U.S. was much greater than over here. This was not due to lack of technical skill in this country, but could be attributed to the high proportion of low-efficiency plant which had to be retained in this country to cope with the peak load.

Generation Developments

Sir John then reviewed the generating plant programme. The total installed capacity of new plant released since the war was approximately 13,000 MW. Of the plant programmed for the five years 1946-50 only 47% had been commissioned by the end of that period. Sir John did not propose to go into details of the reasons why this shortfall had occurred.

Dealing with the actual generating plant itself, much thought had been given after the war to new standards to be adopted in order to secure rationalisation of design. Discussions with the manufacturers indicated that there should be no difficulty in building straight condensing sets up to 60 MW at 3,000 r.p.m. The position was not so clear with regard to boilers, and at first it was thought necessary to limit capacities to 360 k.lb/hr, for which either fusion-welded or forged drums could be used for designs involving only one or two drums. A number of stations were therefore planned with two 60 MW turbo-alternators, each associated with two 360 k.lb/hr boilers. Manufacturing developments later made larger sizes practicable and the more desirable unit layout of one boiler to one turbo-alternator became possible in capacities up to 100 MW.

In the present programme some 10,400 MW of plant had been ordered on the following cycles:—

(*a*) 3,207 MW, comprising 96 turbines and 160 boilers at 600 lb/sq in., 850° F, 340° F feed water.

(*b*) 6,315 MW, comprising 108 turbines and 181 boilers at 900 lb/sq in., 900° F, 385° F feed water.

(*c*) 880 MW, comprising 12 turbines and 12 boilers at 1,500 lb/sq in., 1,050° F, 400-430° F feed water.

The use of reheat had been carefully considered, and although this cycle was particularly sensitive to changes in load and fuel quality, it was thought that by locating the primary superheaters in the radiant-heat zone or the use of tilting p.f. burners, it could prove satisfactory on British fuels. One of the new stations had therefore been designed for high temperature and pressure using reheat.

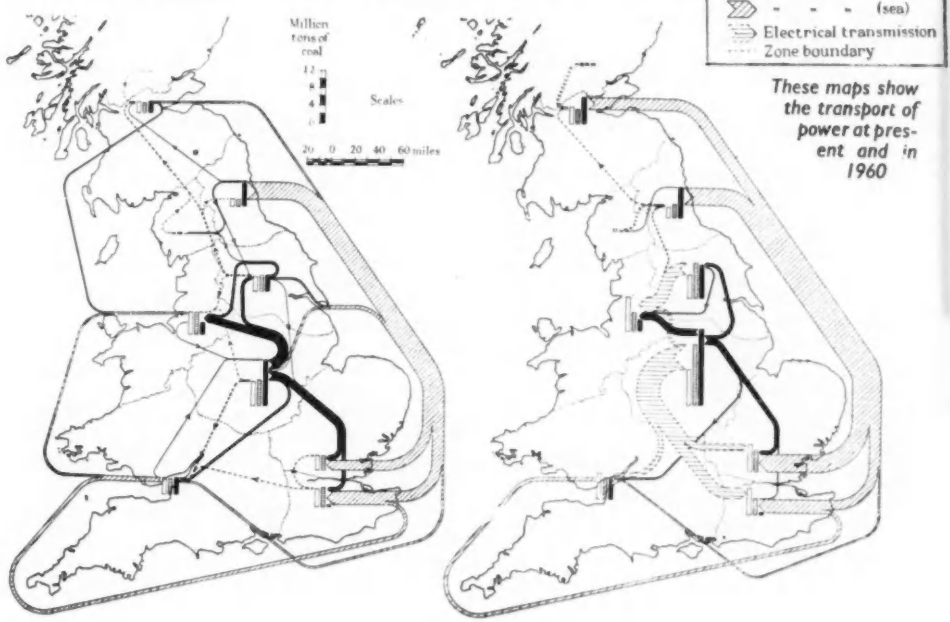
It was expected that three gas-turbine installations would be commissioned this year—two 15 MW units for the B.E.A. and one 12·5 MW unit for the North of Scotland H. E. Board.

Other cycles being investigated included one which used steam in a closed gas turbine cycle in conjunction with a l.p. condensing turbine; the mixed gas and steam cycle; and various combinations of gas turbine and turbo-alternator techniques.

Water power was largely limited to the North of Scotland, and it was expected that the schemes being constructed there would, when completed, have an output of 500 MW. Investigations were also being made into the use of wind-power, tidal power (particularly the Severn Barrage Scheme), and on the possibility of using heat from atomic piles.

Transmission Developments

Two major projects formed the principle items of transmission development dealt with. The first of these was the co-ordinated planning of the 132 kV grid, and the second, the construction and development of the 275 kV superimposed system. The Grid, as originally designed, was intended to facilitate the pooling of generating plant within defined areas. It was founded on the principle that each area would normally operate independently; the few circuits linking adjacent areas were intended only for occasional use, to facilitate maintenance or in emergencies. The varying growth of load, however, in different areas, caused a situation to arise where some areas had a deficit of generating plant, while others had a surplus. Interconnected operation of all areas was therefore tried experimentally in 1938 and has continued ever since. Thus, for 13 years the Grid had performed a function for which it was not designed, namely national pooling instead of regional pooling. Present-day circumstances had led to ever heavier loading of the Grid, which at present was more heavily stressed than at any time during the war. Although a number of 132 kV lines had been added, the Grid still retained its original form, with relatively light connections between the various areas, which made bulk transfer of power most difficult. It was decided that the necessary reinforcement should take the form of a 275 kV



These maps show the transport of power at present and in 1960

superimposed network, which, beside aiding the transfer of energy between areas, would also provide for the transmission of power from the coalfields to the centres of industry. The main features comprised a central ring embracing the East Midlands, the Midlands, Lancashire and the West Riding of Yorkshire, with a connection to Scotland via the North-East Coast and Carlisle, and two lines direct to the London area. These connected to a horse-shoe round London, terminating at Tilbury on the north bank of the River Thames, and Littlebrook on the south. A third connection between the Midlands and London was formed by a line via the Severn Valley.

Bulk Transmission

Two sizes of conductor would be used: twin 0·175 sq in. per phase having a thermal rating of about 375 MVA per circuit, and twin 0·4 sq in. per phase, having a thermal rating of about 570 MVA per circuit, i.e. 1,140 MVA gross capacity per line of towers. The smaller conductor size would be used for interconnection only. The heavy circuits, however, would provide for a total export of nearly 3,000 MW from Yorkshire, the East Midlands and Midlands to other areas.

Provision was being made in the tower design for the voltage to be raised to 380-400 kV in the future, should this be found economically desirable.

Substation equipment for these voltages would, of course, take up more space due to the larger clearances involved. For example, a station containing ten 275 kV bays with transformers and associated 132 kV equipment would take up about 2½ acres.

Since 1939, the coal consumption of the electricity supply industry had nearly doubled, and the combined contribution of the East Midlands and Yorkshire coalfields increased from 30% to 39% of the total. This trend was likely to continue. Because of the relatively long initial rail haul from the pithead to the port, it was found that considerable net savings could be made by transmitting the energy as electricity. In the illustration, the map on the left shows the transfers of energy taking place between different zones in 1949; the right-hand map shows the situation as it is estimated to be in 1960. Such a forecast must, of course, be somewhat speculative, but it shows the general trend. Some 70% of the total energy exported from the Mid-East and Central zones will then be handled electrically.

The address continued by giving some details of the research being undertaken by the Authority. The scope was wide, extending from specific problems affecting thermal efficiency and plant availability to utilization research and long term matters including the possibilities of entirely different methods of generation.

On vesting day, the Authority inherited a number of relatively small laboratories in different parts of the country together with a transmission research laboratory which had been established by the C.E.B. at Leatherhead. Since vesting day the activities of the latter establishment had been widened to cover other aspects of research, and the buildings were in process of being extended to the limit of the site. The long-term plans of the Authority, however, included the establishment of a very substantial central research organisation which would be developed from the Leatherhead establishment.

It was hoped to attract a bigger proportion of high-grade graduates into electricity supply research by fostering schemes involving this type of work at the universities and the technical colleges.

Electrical Safety

DESPITE the widespread use of electricity, the number of fatal accidents arising from shock is remarkably low in comparison with other causes. Nevertheless, investigations into the fatalities which have occurred lead to the conclusion that with more care and attention many need not have happened.

In his Chairman's Address to the London Students' Section Mr. K. C. Pounds, B.SC.(ENG.), dealt with the reasons for many of these accidents, and gave details of test procedure and of systems which if adopted would contribute to the general safety of installations. Earthing provides an apparently simple answer to many situations, but it was pointed out that many apparently safe earths had a resistance high enough to cause danger in fault circumstances. Such items as portable tools with their trailing leads required special attention. Using a low voltage such as 55 V to earth had much to recommend it, but for the standard 240 V portable tool the only remedy was regular test and inspection.

A new danger had been introduced by the use of high frequency electronic equipment where due to standing wave and capacitance effects high voltages could appear in apparently safe places.

On the domestic side, the speaker said that there were arguments as to the advisability of earthing installations or not. In the kitchen or bathroom earthing was of importance: in other rooms it could introduce shock risk where none existed before. The Address concluded by describing some of the installation mistakes common in the domestic field and some fires of electrical origin.

Notes on Wiring
by MEGOHM

FORM OF TENDER

Unnecessary information is too often required

FOLLOWING on my previous notes, I am told that something should be done to not only simplify the make up of the form of tender but also the schedules issued for electrical installation work. These forms and schedules, engineers say, require general overhaul with a view to cutting out wasteful sub-division and copying work. Recent invitations to tender for electrical installation work issued call for sub-division of the lump sum form of tender as follows: (*a*) Supply and delivery of lighting fittings, switches, switch sockets, etc. (*b*) Supply and delivery of control and distribution equipment. (*c*) Supply and delivery of p.i.l.c.s.w.a. cables. (*d*) Supply and delivery of v.r.i. cables. (*e*) Supply and delivery of conduit and conduit accessories. (*f*) Supply and delivery of m.i.c.s. cables. (*g*) Installation and commissioning.

Increased Work

The schedules include every type and class of cable, conduits and conduit boxes, distribution and switch gear, switches and switch sockets, etc., although many of the items may not necessarily be required for the work specified. Further, the pricing of each item has to be sub-divided into materials and labour components. As an example, p.i.l.c.s.w.a. cable costs are required under the following headings: (*a*) Cost for supply per yard. (*b*) Cost for installation per yard. (*c*) Cost of cleat and steelwork per yard run. (*d*) Total cost. (*e*) Cost of termination per end.

Little imagination is required to visualise the multiplication of rates to be prepared and the increased estimating work to meet such requirements.

Another condition is that the contractor is instructed to return four copies of each of the schedule of rates duly completed, including schedules detailing manufacturers' names, place of manufacture, place of inspection, list numbers and other data. Since six to eight contractors are usually invited to submit tenders for the work, there appears little justification in insisting on the contractors submitting with their tender the several schedules completed in quadruplicate. This multiplication of form filling and resultant wastage should be discouraged and the authorities responsible for issuing such documents should examine the position and see what saving in time and labour can be made by the preparation of a simplified form of tender and schedules.

No Useful Purpose

It is difficult to understand what useful purpose is served asking six to eight estimators to detail the cost for supply and delivery only, for say one hundred and one specified lighting fittings, or m.i.c.s. cables, when these costs are known to installation engineers. If the people who are to decide the placing of an order must have this information, then surely the engineer who prepares the specification, and presumably the schedules, is fully aware of the net costs and should enter them on his schedules, leaving the contractor to add his percentage on the net costs to cover charges.

I am told an inquiry issued by one Ministry involved the preparation of over 2,000 rates for a lump sum contract of under £8,000. The work involved in examining 8 schedules, each containing over 2,000 rates and endeavouring to work out the costs for various sections and types of work to ascertain which schedule submitted was the most favourable, must take the Ministry's surveyors some time to determine.

During and at the completion of the contract, measuring, billing and pricing the quantities against the respective rates must again take considerable time. These costs are generally not known, since the time expended in measuring, billing and pricing is usually not recorded, the costs being allocated to overhead and establishment charges by the contractor and by fee to the Surveyor paid by the Ministry.

A form of tender and schedules reasonably drawn up can be useful, but when taken to extremes such as including rates for conduit bends, cutting flat iron per inch and the like, then such schedules surely must be a burden, not only to the engineer, but to the surveyor and accountant who have to prepare and agree the final account for the works installed.

Problems and Practice IN ENGINEERING

Connecting Starters

STAR-DELTA starting of squirrel cage induction motors is comparatively common, and for this reason, perhaps, authors of text books and installation manuals tend to confine themselves to the presentation of diagrams when dealing with the question of wiring and connecting, regardless of the economies that can be effected and of the errors occurring in practice.

An inexperienced man armed with a diagram does not always appreciate that under normal conditions the conductors between the starter and motor need only be capable of carrying $1/\sqrt{3}$, say 60%, of the rated line current of the motor, plus an appropriate allowance for volt-drop: thus, the opportunity to save labour and materials in considerable measure is lost.

The terminal markings of starters and motors rarely correspond with either each other or the diagram, unless all are by the same manufacturer, and this leads to mistakes in connections. The method I have always adopted and commend to your readers applies to all makes of motors and starters and dispenses with diagrams. A bell-set may be used for identifying connections but a "Megger" alone is preferable since it can be used for testing insulation resistance on completion of the installation.

The procedure, assuming the cables are ready for connection at starter and motor, is as follows:

(*i*) Disconnect the under-voltage release in a hand-operated starter and disconnect or isolate the contactor closing coils in contactor type gear.

(*ii*) Connect at random the six motor connections to the load terminals of the starter. The latter can be determined usually by inspection.

(*iii*) Identify the respective windings of the motor by testing between each of the six terminals in turn until the three pairs have been located. The positions of the terminals relative to their pairing should be noted, and labelled A-A1 B-B1, C-C1 according to the terminal grouping.

(*iv*) Place the handle of the starter in the start position or physically close the starting unit of the contactor gear, and hold or wedge in position.

(*v*) A "Megger" test of the conductors at the motor end will reveal a short circuit between three of the six ends.

(*vi*) Connect at random these three short-circuited conductors to either the group of terminals marked A, B, C or that marked A1, B1, C1.

(*vii*) Similarly, place the starter in the run position or close the running unit of the contactor, first opening the starting unit.

(*viii*) "Megger" test between the conductor previously connected to motor terminal A, say, and each of the remaining free conductors. A zero reading indicates the required common connection. This common conductor should then be connected to terminal C1. Similarly, the free conductors common to terminals B and C may be found and connected to terminals A1 and B1 respectively. The key to this aspect of the procedure is to couple the first three letters of the alphabet with a hansom cab, i.e. ABC—CAB.

(*ix*) Restore starter to normal and reconnect under-voltage release or contactor closing coils.

In conclusion, I would add that attempts to reverse the rotation of the motor by changing over two of the connections at the motor, are not unknown.—"1066."

A Simple Precaution

I WAS very interested in Mr. R. W. Marsh's account of the circumstances which led to a lady receiving a severe shock when filling a kettle with water from a tap.

Whilst agreeing with all Mr. Marsh says regarding the danger of neutral fuses, I would point out that similar accidents with electric kettles can only take place when the flexible cable supplying the kettle is long enough to allow the kettle to be filled, from a tap, without disconnecting either the plug from the socket or the connector from the kettle.

A similar accident (unfortunately fatal) happened a few years ago due to a fault on an "unearthed" kettle. Thereafter the supply company concerned made it a rigid rule never to fit a flexible cable longer than 2 ft 6 in. (or shorter if possible) to any electric kettle, in order to prevent the kettle being filled at a tap whilst connected to a wall socket.

This is obviously a wise precaution, which I would recommend, especially in view of the small dimensions of some modern kitchenettes. In rooms, other than kitchens, a short flexible cable will also greatly reduce the risk of non-electrical accidents with kettles, etc.—*Thos. H. Heritage.*

Detection of Faults in a Busbar Protection System

AN interesting problem arose on a metropolitan distribution system when it was decided to check the frame insulation of a large bank of switchgear at an important zone substation. The test had to be carried out with the busbars alive, and hence it was not safe to remove the earth connection and use a Megger.

However, by connecting a heavy current, low impedance transformer winding between the frame earth bar and the station earth, sufficient current could be passed into the undesired earths to warm them up, whilst maintaining a solid earth on the switchgear framework.

The attached diagram shows the connections used for a test of the frame insulation of group No. 4.

Faults such as studs earthing on to cable glands were shown up by their rise in temperature, and a "clip-on" ammeter found out faulty conduits and internal wiring earths. Some pedestal bolts had a very low resistance to earth, probably due to contact with reinforcing rods in the concrete floor. However, about 70% isolation was achieved which was adequate to ensure that sufficient current would pass through the protective current transformers.—*E. G. Williams, Graduate I.E.E.*

Aids to Installation

ON occasion, contracting electricians are called to install lighting in small halls, etc., with no facilities for reaching ceiling height. In this case, the position of points may be marked off on the floor first. Couple together lengths of inch conduit sufficient to reach the ceiling, and place a coupling plugged with wood at one end. A straight packing needle should be firmly pushed into the wood, and a plumb line threaded through the eye.

It only remains for this "fishing rod" to be held so that the plumb line falls over the mark on the floor; the needle can then be pushed through the ceiling plaster. The position can be opened up from attic or floor space above.

Another convenient accessory that can be fabricated from conduit is a fish-tape holder. For this, any $\frac{3}{4}$ in. conduit cuttings about four feet in length will serve. Start the conduit with an easy bend, then bring the ends round an empty oxygen bottle until they overlap. Cut the surplus away to form a break in the circle of about five inches length, and line up the ends in a parallel vice. The fish tape is then threaded into the holder, leaving the ball end out. When wiring near moving machinery, the advantages of this holder will be appreciated.—*W.B.*

Tool Testing

Two errors occur in the note which appeared under the above heading in our issue of October 4. Reference is made to a "short on the instrument case" where "chart" was intended, and in the diagram a connection to the earthed case of the triple pole socket on the adaptor set is omitted.

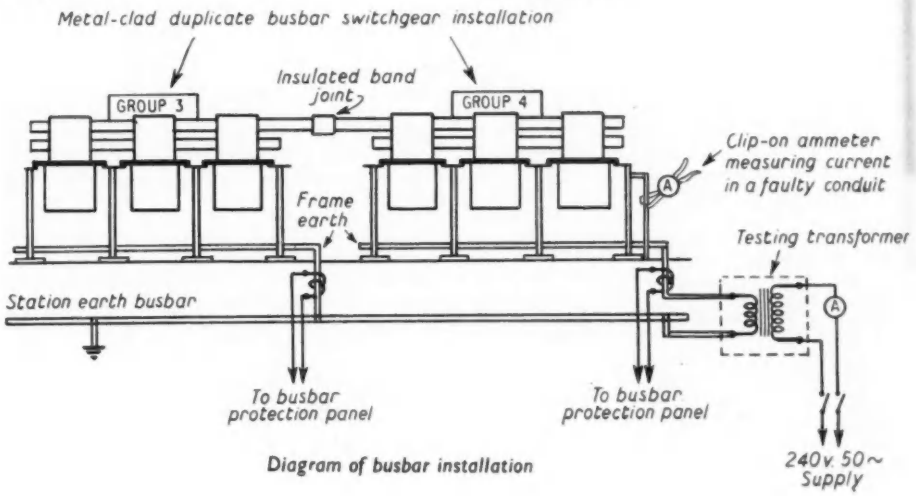


Diagram of busbar installation

overseas news

Station Site

Experts of the Electricity Trust of South Australia had considered the possibility of establishing a power station on the Moorlands coalfields, the State Premier, Mr. Playford, stated in the Assembly recently. But they had decided that other proposals had more prospects for the supply of electricity at low cost.

Tariffs Up Again

Sydney County Council has decided to increase tariffs again. With effect from January next, domestic charges will be raised by 10·5%, while the commercial rate will go up 22·2% and the industrial rate by 24·2%. It is estimated that the increase will provide an additional revenue of more than £2 million annually. (The Council raised its charges in March last.)

Butlers Gorge

It is expected that the Butlers Gorge power station of the Hydro-Electric Commission of Tasmania will be in operation this week. The premier, Mr. Cosgrove, stated that engineers of the Commission had been testing the machinery. The station is at the foot of the Clark Dam, and has one 17,000 h.p. vertical turbine to utilise available heads between 80 and 160 feet.

St. Lawrence Scheme

The Canadian Government has announced that it will ask Parliament for authority to go ahead alone, if necessary, with the development of the St. Lawrence seaway and power project. In 1941, America and Canada agreed to a project for exploiting the power resources of the St. Lawrence and deepening some of its channels to make the 1,945 mile river navigable by large ocean-going ships. So far, American Congress has failed to approve the project, although President Truman last month indicated that he would support independent action by Canada if joint action between the two countries proved to be impossible. In the speech from the Throne, at the opening of the autumn session in Ottawa, it was stated that Parliament would be asked to authorise establishment of a federal agency to deal with construction of the project. Meanwhile, in Washington, a vice-president of the United Mineworkers of America, last week reiterated that union's opposition to the scheme, suggesting that Canada might turn to the U.S. for the necessary finance. But it has been pointed out that when opposing the scheme ten years ago, the Union "were afraid that electricity generated by the St. Lawrence project would displace coal."

Trenton Starts Up

The new Trenton steam power station of the Nova Scotia Power Commission was formally put into operation a few days ago. With one 10,000 kW turbo-alternator already installed, a second similar machine is expected to be in commission in the spring. The station, which has been operating for some time, is designed for further extension.

Optimism

The Hydro-Electric Power Commission of Ontario expects to be able to get through the autumn and winter without serious difficulty, the chairman, Mr. R. H. Saunders, stated recently. The Commission operated an additional 20,000 h.p. unit operating at the Chenaux development last month.

Expansion

The Canadian General Electric Co. Ltd., has purchased a 140-acre site near Weston, Ontario, for the construction of a $12 million plant in which to manufacture power transformers, h.v. bushings and instrument transformers. It is expected that the factory will be in operation in 1953, giving employment for 1,200 workers.

Manufacturer's Plaint

The Canadian Government's policy on credit restrictions and increasing excise taxes had made it too difficult for people to buy electrical appliances, was the plaint of many representatives at the annual meeting of the Canadian Electrical Manufacturers' Association a few days ago. They feel that the appliance industry is being made to bear too heavy a part of the fight against inflation. "It is reasonable to believe that the taxes and credit restrictions were intended to effect a 20% reduction in appliance production, whereas the output of Canadian manufacturers in the last two months was down 60%," one representative stated. Mr. B. Simpson, general manager of the Association, put forward the view that local plants could not compete successfully with imports from the U.K. where wage rates are lower, and the U.S.A. where the industry is over-producing. Already, many U.S. appliances were being dumped in Canada, he alleged. "As to imports from Britain, it would seem that with the considerable decline in exports to Great Britain that Canada should resist the inroads of British manufacturers in a field which can well be supplied by Canadian manufacturers," the conference agreed.

Further Unit for Niagara Falls

Ontario Hydro-Electric Power Commission has decided to install a further 100,000 h.p. unit at its Niagara Falls Project, according to Mr. Robert Saunders, chairman.

Modernisation

Paris is to replace its present gas street lighting with fluorescent lighting, we understand. There are at present about 32,000 gas burners in use in the city's streets and the replacement of 8,000 by fluorescent lamps has commenced.

Norway's Railways

With the recent inauguration of the electrified network of the Norwegian State Railways from Lillestrom to Charlottenberg, it is now possible to travel by electric train to Oslo from Stockholm as well as from Gothenberg. But until more electric locos are delivered, some trains will continue to be steam-hauled on the Norwegian side. The State Railways have now about 640 miles of electrified track—23% of the entire railway network. All operate at 15 kV, 16⅔ cycles except the section between Narvik and Vassijaure, in the north, which has a 15 cycle system.

Solar Power

The National Physical Laboratory in Delhi is now conducting experiments to utilise solar power in three ways, according to Mr. Sri Prakasa, Minister for Natural Resources and Scientific Research. In reply to a question in Parliament recently, he said that experiments were being carried out at the laboratory to evolve simple and intensive methods for carrying out (*a*) air-conditioning of buildings and running refrigeration equipment with the help of solar heat; (*b*) to utilise solar energy for the generation of power by means of heat engines, thermostatic generators and photo-electric generators and (*c*) to determine the possibility of cooking foods and drying fruit with the help of solar heat.

Development Regulation

The Industries Development and Regulation Bill, which was passed by the Indian Parliament last Friday, provides for the introduction of a system of licensing for new industries and the appointment of a central advisory council for the development and regulation of 37 specified industries. The industries covered include telephones, heavy machinery, machine tools and metals. To some extent it may be regarded as a consolidating measure, but one provision curtails freedom with which the Government has hitherto issued control orders in regard to various industries. In future, before the Government can issue any control order an expert committee must first examine the problem.

West Bengal Development

The Electricity Directorate, Government of West Bengal is making good progress with the preliminary work on the Rs 67-lakh electrification scheme, which forms an important part of the Rs 15-crores Mayurakshi project undertaken by the State Government. A route survey of a network of about 80 miles of h.t. transmission line has already been made, and the Directorate is at present engaged in the design, layout and preparation of specification for the two 2,000 kW hydro-electric power stations. Power will be distributed over an extensive area from Rampurhat, in the north to Santiniketan in the south. The system will probably be interlinked with the Damodar Valley and North Calcutta grid at a later stage.

Belgian Congo Schemes

In a plan for the further development of the Belgian Congo, the question of the construction of a hydro-electric power station on the Sebea River near to Kisenyi on the Lake Kivu, is under consideration. At this point the river has a fall of 160 metres. The scheme would necessitate the construction of a barrage some 2 kilometres from Kisenyi, to form a suitable reservoir. In another scheme for the Belgian Congo, constructional work is expected to start at the beginning of next year on the hydro-electric power station on the Tshopo River at Stanleyville. This station will house three 8,360 h.p. turbines which will be supplied by Etablissements Neyrpic, of Grenoble.

Power Scheme for Ethiopia

Engineers from the U.S.A. are to visit Ethiopia shortly to consider the construction of a dam across the Blue Nile as part of a hydro-electric development scheme to supply the whole of Northern Ethiopa with electricity.

Magnetic Alloys

The Japanese post-war metallurgical industry has made considerable progress with the development of magnetic alloys for use in electrical instruments, etc. Before the war they had developed an alloy using a combination of aluminium, nickel and cobalt, but in order, however, to eliminate the need to use strategically important ores such as cobalt and nickel, they have now developed and taken out a patent for a new magnetic alloy of aluminium and chrome, which is said to have properties equal to "Alnico," and to be between seven and eight times as good as steel for the purposes for which it is designed. Large orders have been placed by the U.S. for this new alloy, it is stated.

Lamp Production

Shortage of raw materials has forced the Chinese-operated Starlight electric lamp bulb factory at Hong Kong to cut its staff by two-thirds and production by nearly one-half, it is reported. The shortage has arisen from the United States restrictions on shipments of strategic goods to Hong Kong. The factory, which formerly employed about 300 workers and produced 70,000 bulbs a day, now has only 100 employees and produces 40,000 bulbs. It expects to close down completely when its remaining stocks of raw materials are exhausted. The principal markets for the factory's products are the U.S.A., Britain and the Commonwealth.

PERSONALITIES

IN THE INDUSTRY

More than fifty-one years' service with the Liverpool electricity undertaking is the proud record of **Mr. E. L. Morland,** M.B.E., M.I.E.E., sub-area engineer, No. 1 Sub-area of the Merseyside and North Wales Electricity Board, who retires next week. Mr. Morland has been a familiar and well liked character in the region for many years. Actually, he started with the Liverpool Corporation Electric Supply Department, in February, 1900, and became assistant engineer in 1908. From 1928 till vesting day, he held the position of superintendent engineer in charge of distribution, serving for most of the time under another of our old friends, the late Mr. P. J. Robinson. During this period a considerable amount of mains development was undertaken, and Mr. Morland was responsible for the layout and construction of the a.c. system and its maintenance and that of the d.c. system too. An active member of the Mersey and N. Wales centre of the I.E.E. since its inauguration in 1919, he was chairman of the centre in 1938-39. He has also served on numerous technical committees of the I.M.E.A., E.R.A., and E.D.A. But although he retires next Tuesday, Mr. Morland tells us that he will still be pleased to welcome friends at his address, "Glenside," Glendyke Road, Allerton, Liverpool 18.

Mr. E. L. Morland

Mr. P. Blunt, B.Sc. (Eng.), M.I.E.E., A.M.I.Mech.E. has been appointed deputy sub-area engineer of No. 4/5 Sub-Area of the Merseyside and North Wales Electricity Board, in succession to Mr. G. F. Davies, M.I.E.E., now the engineer of that sub-area. Mr. Blunt was previously senior assistant engineer (planning and operation) at the headquarters of the Midlands Electricity Board. Earlier, he served with the Wolverhampton and Newport (Mon.) Corporation undertakings, the Mid-Lincolnshire Electric Supply Co. and the Leicestershire and Warwickshire Electric Power Co. Ltd.

The British Aluminium Co. Ltd. has announced changes in the sales division at head office : **Mr. S. M. Lawrence** is now assistant sales manager, unwrought and special products, in place of Mr. R. M. Warrington who will be relinquishing his appointment with the company on October 31. **Mr. O. M. Bruce Payne** has taken over responsibility for the technical service section of development department, under the development manager, in place of Mr. Lawrence.

His many friends in the industry will be interested to hear that **Mr. J. F. Stanley,** B.Sc., A.C.G.I., M.I.E.E., assistant technical director in charge of the work of the electrical section of the British Standards Institution, went into hospital yesterday for an appendix operation. He expects to be back at work at the B.S.I. about the middle of next month.

Chief purchasing officer of the Igranic Electric Co. Ltd., **Mr. H. H. C. Wood,** was elected vice-president of the Purchasing Officers' Association at the annual conference. Mr. Wood, a founder-member, was chairman of the Bedfordshire and Hertfordshire branch for three years, and has been a Council member of the Association for several years.

The Duke of Edinburgh has accepted honorary membership of the British Institution of Radio Engineers.

Mr. H. C. Skinner has relinquished his appointment with Charles F. Higham Ltd., advertising agents, to take up a position as controller of Trade Press advertising with L. D. Group Publicity, who, under the management of **Mr. W. L. Allison,** M.I.A.M.A., are responsible for the publicity of all the subsidiary companies of Lancashire Dynamo Holdings Ltd.

Lansing Bagnall Ltd. announce that **Mr. A. R. Wright** has been elected to the board of directors. He has been associated with the company for ten years.

Our hearty congratulations to **Miss H. S. O'B. Hoare** on her engagement to be married, are tempered with regret, for she has resigned from her position as publicity manager of Ferranti Ltd., we learn. Miss Hoare has become well known in the industry, although she has been publicity manager of the company only since 1945, having joined the firm three years earlier. She was one of the original members of the B.E.A.M.A. Publicity Committee, being the only woman ever to have sat on a Beama committee. She was also a member of the B.I.F. Electrical Exhibitors Committee and of the I.A.M.A. Technical Advertising Committee. Miss Hoare was a graduate of Oxford University, where she obtained an Honours degree in modern languages in 1940. Probably not so generally known is that she holds many trophies as witness of her prowess in swimming and in the sporting field.

Miss H. S. O'B. Hoare

Mr. W. N. Duffy, M.S.I.A., F.R.S.A., has been appointed publicity manager of Ferranti, Ltd., in succession to **Miss H. S. O'B. Hoare**. Mr. Duffy has been with the company nearly 20 years, being originally brought in by Sir Vincent de Ferranti as consultant "eye value" man on the firm's products, then became chief industrial artist responsible for the visual appearance of all the company's goods. He should be already well known to many in the industry by his activities at exhibitions where he was responsible for the design and supervision of the erection of stands. He has also travelled extensively abroad for the company. He is chairman of the Manchester Region branch of the Design and Industries Association—he is on the National Council of that body. He is also a lecturer on design and development at the Manchester University College of Technology.

Mr. W. N. Duffy

The Minister of Fuel and Power has re-appointed **Mr. J. M. Airlie** as chairman of the South East Scotland Electricity Consultative Council, and **Mr. A. B. Mackay** in a similar position for the South West Scotland Area Electricity Consultative Council.

At present generation engineer (construction) with the Eastern Division of the B.E.A., **Mr. R. R. Maddock,** B.Eng., A.M.I.E.E., A.M.I.Mech.E., has been nominated chief generation engineer (construction) to the Midlands Division in succession to **Mr. L. J. Jeffrey** who is the new controller of the East Midlands Division. Mr. Maddock took up his present position in 1948, having been with the Northmet Power Co. from 1938, during which time he was responsible for new construction work of the company's power stations, being chiefly concerned with the extra high pressure and temperature plants at Brimsdown and Willesden generating stations during the war. Earlier, he had graduated from Liverpool University, serving a short time with the Corporation undertaking at Lister Drive power station before commencing an apprenticeship with Met. Vick., whose staff he subsequently joined, first in the General Engineering Dept., then on Traffolyte development, and lastly on industrial and central power station work.

Mr. R. R. Maddock

Newly appointed assistant chief engineer of the electronic control department of Metropolitan-Vickers Electrical Co. Ltd. is **Mr. S. A. Ghalib.** A Cypriot, Mr. Ghalib was educated at Victoria College, Alexandria, and University College, London, and following a college apprenticeship with M.-V., he joined the traction sales department. Transferring to the railway signals engineering section, he was engaged on remote power control of gun mountings, and joined the electronic control department on its formation in 1945. He became engineer-in-charge of the department in 1949. Mr. Ghalib is a member of the Ministry of Supply Technical Committee on servo-mechanisms.

Mr. S. A. Ghalib

Mr. T. G. Baird, A.M.I.E.E., has been appointed assistant to the system construction engineer in the Transvaal area of the Electricity Supply Commission of South Africa. He leaves this country for Johannesburg on December 6. Mr. Baird obtained his training with the B.T.H. Co., and joined the Central Electricity Board in 1932, subsequently becoming section engineer at Bedford. In 1948, he was appointed second assistant transmission engineer in the Eastern Division of the B.E.A., and in 1950 became senior assistant co-ordinating engineer in the transmission department of the chief engineer's department at the headquarters of the Authority in London.

Mr. George Caton, M.I.E.E., managing director of Yorkshire Switchgear and Engineering Co. Ltd., left by air recently on a business tour of the Far East and Australia, spending a few days in the Persian Gulf on his outward journey. He expects to return to this country before the end of December after spending a few weeks touring Australia in company with **Mr. J. Wilson,** M.I.E.E., the managing director of the firm's associates, Messrs. Wilson Electric Transformer Co. (Pty.), Ltd., Melbourne.

Newly elected president of the Canadian Electrical Manufacturers' Association is **Mr. H. A. Cooch,** chairman of the Canadian Westinghouse Co.

The Brisbane City Council Electricity Department now has as its new chief engineer and manager **Mr. P. A. W. Anthony,** B.E., A.M.I.E.E., who joined the Council's service last May as chief engineer. (He was previously manager of the Cairns Regional Electricity Board.) At Brisbane he succeeds **Mr. J. H. Hindman,** who has retired after holding the position for many years. Mr. Hindman will stay with the Department for some months to help and advise Mr. Anthony, we learn.

The following staff moves and promotions in the Hoover Ltd. sales-service organisation have recently taken effect. **Mr. R. Forsyth** from district manager, Burnley to branch manager, North Eastern Branch, Leeds. **Mr. H. Wilcock** from branch manager, North Western Branch, Liverpool to branch manager, Scottish Branch, Glasgow. **Mr. G. R. Gallon** from branch manager, North Eastern Branch, Leeds to branch manager, North Western Branch, Liverpool. **Mr. F. Donnelly** from staff instructor to district manager, Carlisle. **Mr. D. C. Howe** from supervisor in the Tottenham district to district manager, Chester. **Mr. L. C. Smith** from supervisor in the Channel Islands to district manager, Burnley. **Mr. F. Thompson** from supervisor in the Bradford district to district manager, Manchester, and finally, **Mr. V. M. Gardham** from district manager, Manchester to district manager, Hull.

OBITUARY

Mr. H. S. Seccombe, chairman and managing director of Electrical Components Ltd. for over 30 years, died on October 7, aged 62.

Mr. P. M. Brandon, director of Halseys Electric Co., Ltd., died on October 8.

Mr. David Llewellyn Morgan, A.M.I.E.E., formerly of Abercynon and Malaya, died at Teignmouth on October 6.

Mr. V. W. Bone, formerly chairman of Ruston and Hornsby Ltd., died on October 12, aged 68.

The death occurred in New Jersey, U.S.A., last week of **Mr. E. W. Hammer,** aged 83, who was an associate of Thomas Edison in connection with the latter's electrical engineering experiments.

Mr. G. F. Fowler, who served the Dundee electricity undertaking for over 48 years, retiring last year from the post of superintendent of the consumers' department, died on October 5, aged 66.

Mr. H. N. Baker, formerly of the Metropolitan-Vickers Electrical Co., died on October 10. He entered the service of British Westinghouse Co. in 1903, and was district engineer in the London and Home Counties area until 1927, when he joined the London Sales staff, followed by service with the Ministry of Works and the Iraq Petroleum Co. He will long be remembered by power station engineers in the London area for his outstanding work as district engineer with the old British Westinghouse Company (now Metropolitan-Vickers Electrical Co. Ltd.).

Wills.—Mr. Frank Panter, of Prestatyn, Flintshire, a former works manager of Erskine Heap and Co., Ltd., who died on Jan. 28, last, aged 87 years, left £3,551 (£3,475 net value).

Mr. Ernest Knowles, of Morecambe, a former electrical transport superintendent in South Africa, who died on May 1 last, aged 74 years, left estate in Great Britain valued at £727 (£681 net value).

NEW LITERATURE

Garcke's Manual

THIS 1950-51 edition of a faithful servant shows some important changes. First of hese is the reintroduction of the section dealing with British electrical and allied manufacturing companies, giving finance details, names of directors, etc., which was a valuable feature of former editions. Many will also find the new arrangement of the data relating to the Area Boards a considerable improvement. Here, in a new sub-section, the particulars of all districts within the respective sub-areas are arranged in one alphabetical order throughout, to provide easy reference. As before, particulars are included of the North of Scotland's Hydro-Electric Board and other supply undertakings in Great Britain; together with a directory of personnel. It is perhaps, a little unfortunate that the B.E.A. statistics are already outdated but one's attachment for Garcke's ensures for it a ready niche on the shelf of reference works. Published by Electrical Press, Ltd., 1,000 pages, 8¼ in. by 5½ in. Price £3 10s.

The Industrial Applications of Gas-Filled Triodes

by R. C. Walker, B.SC., A.M.I.Mech.E., A.M.I.E.E.

THE grid-controlled gas-filled triode, more commonly known as the thyratron, is one of the most necessary tools in the electronic engineers work-box and this book which deals exhaustively with its application to industrial devices and requirements, will be found of considerable value.

Clearly written and well illustrated, the book progresses in orderly fashion from the fundamental characteristics of the simple thyratron and, after considering its limitations, to the "shield grid" type. Methods of application and basic circuits are followed by chapters on the use of the thyratron as a switching device, in relaying, in indicating, controlling and measuring, as a voltage or current regulator, and as a commutating device in rectifier and inverter applications. A concluding chapter deals in similar workmanlike manner with other types of gas-filled valves, such as ignitrons, cold cathode tubes, strobotrons and flash tubes. There is a comprehensive bibliography and a number of appendices in which are thoughtfully segregated some of the mathematical proofs which the average reader is only too happy to take for granted. With 326 pages, 8½ in. by 5½ in., the book is published by Chapman & Hall Ltd., at 37 Essex Street, W.C.2, at 40s. net.

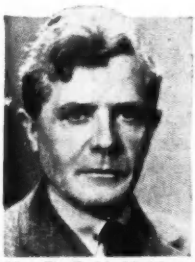
BOOK RECEIVED

Definitions and Formulae—Practical Mathematics, by L. Toft. Students' reference book. Published by Pitman, 38 pages, 5½ in. by 4 in. Third edition, price 1s. 6d.

ESSENTIAL RESEARCH

The A.S.E.E. Presidential Address

THE necessity for research on the fundamentals of electricity generation and transmission, and coal utilisation, was the main theme of the Address to the Association of Supervising Electrical Engineers by MR. T. GRAEME N. HALDANE M.A., M.INST.C.E., M.I.E.E. who is undertaking a second term of office as President of the Association.



Mr. T. G. N. Haldane

Certain matters which vitally concerned the Association were dealt with at the opening of the Address, the most notable being the question of associations for electrical technicians. Referring to discussions with the I.E.E. upon the subject, he said that he had hopes of most fruitful results. In his opinion it was far better to take advantage of the knowledge and experience of existing bodies rather than to attempt to create new organisations, and he felt that the A.S.E.E., with the planned extensions which the Council had placed before the I.E.E. would afford an opportunity for this large body of individuals who had so long been left out in the cold to feel that they had a home. Not only would they gain by contact with the more senior grades of membership but the A.S.E.E. —in spite of the necessity for considerable adjustment in its scope and organisation— would eventually find itself strengthened.

Shortages

We lived in an age of crises, said Mr. Haldane, turning to technical matters, and reviewing the shortage of generating plant and the slow rate of increase as compared with the U.S. target of 7,000 MW/year.

Our present rate was something over 1,000 MW/year with an ultimate target of something like 1,800 MW/year. Allowing for the 3-1 population ratio of the two countries, we should not keep pace with the U.S.A. until we managed to step up our increase to over 2,000 MW/year.

If the consumption per operative worker of the two countries were compared, the result was even more striking. In 1949 we were using 3,200 kWh per operative worker, whereas, the U.S. figure was 11,700. During 1950, our increase in units generated was about 12%, but even this did not keep up with the U.S. whose increase was about 13%. There were fields in which we had much to learn from the U.S. just as there were fields in which they had something to learn from us.

While the speeding up of an increase in generating capacity was a fundamental line of attack, it was by no means the only answer, and increasing advantage could be gained by developments in h.v. transmission, and both a.c. and d.c. represented fruitful fields for research. The new B.E.A. 275 kV grid would, he felt, when completed, give an advantage equivalent to some 5% of the peak load.

Another contribution towards the solution of the peak load problem lay in the development of pumped hydro storage, which had been used to some extent in Germany. The size of reservoirs required was not as great as might be imagined, if a reasonable head were utilised, and hydro plant could be manufactured without encountering the major bottlenecks which restricted the output of thermal plant.

We were, however, on the verge of a coal crisis. Overall consumption reached 202,000,000 tons for 1950 and was forecast at 210,000,000 tons for 1951, and even a long-term view failed to give any reassurance that supply would overtake demand. It would appear that electricity alone would require an additional 10,000,000 tons by 1961-65. This represented some 20,000 m kWh. If we were short of this amount we would be hard put to it to make ends meet, even if we developed all our water, tidal, and wind power resources to the utmost.

Gas turbines and improved transmission facilities would not replace coal, but could help in its economy. In assessing the economics of schemes, it should be borne in mind that the coal saved would otherwise probably have to be imported at a considerably higher price. Nuclear fission, he considered, was not a short-term possibility. Railway electrification could save us 10,000,000 tons annually, and it was a great pity that it was not commenced after the Weir report in 1931, when there was large-scale unemployment and unused resources. Today we could hardly expect to superimpose such a programme on top of an economy so strained by a rearmament programme.

More Research Needed

He would, he continued, put forward a most earnest plea for continued—or increased—expenditure on research, development and planning work, which we could afford even under present austerity conditions. It was all the more important since this essential research is often slow and the time necessary is often under-estimated, although so were the ultimate benefits. The gas turbine was a case in point. Development during the war was rapid and there was some over-optimism about the development of large units, the difficulties—in particular the length of life required—being not fully appreciated. Larger units had shown signs of becoming so complex that the reduction of capital costs so confidently expected might not materialise, and there were many other items which showed that there was yet a long row to hoe. Nuclear fission and wind power both presented somewhat similar delays.

The important point was that basic research took a long time, and the coming coal shortage did not promise much breathing space. He would like to see all research which was likely to reduce coal consumption pressed ahead with all possible speed. Harking back to the time when hydro power was opposed on the grounds that reduced coal consumption would lead to unemployment, he expressed doubts upon the appreciation of the seriousness of the situation by the general public.

Not wishing to end on a pessimistic note, he pointed out that physical difficulties can be—and are—overcome when the need is really urgent. The human problems were, however, far more complex and much more important. If we knew as much about the human mind, our own included, as we did about physical things, the world would be a much better place.

ENGINEERING IN AGRICULTURE

I.B.A.E. Presidential Address

GREAT BRITAIN had the most highly mechanised agriculture in the world, said MR. F. E. ROWLAND, M.I.E.E., M.I.B.A.E., in his presidential address to the Institution of British Agricultural Engineers on Tuesday. Instancing progress of a century in corn harvesting by mechanisation, he pointed out that the 126 men required, in 1840, to harvest and thresh a 6-quarter wheat crop at 10 acres a day was reduced to 32 in 1870 by the reaper and early thresher; to 21 in 1900, to 18 in 1920 with modern binder and thresher and with the combine harvester to three men in 1940.

Mr. F. E. Rowland

In spite of the shortage of raw materials, expansions of the agricultural engineering industry had been significant, he continued. Steel consumption was 385,000 tons in 1950, representing 172% increase on that of 1946, while in the same period export had increased by 600%, the figure now standing at £42·8 million—slightly over one half of the total production value. Nevertheless, urgent consideration should be given to increased resources for agricultural engineering research, in view of the industry's responsibility for feeding the nation. An adequate appropriation would be small, he continued, compared with the vast sums being spent on rearmament.

A brief review of the Institution's formation in 1938 and its present scope included some account of the activities of the local centres in Norfolk, Northern England and the West Midlands. Particular stress was laid upon the necessity for adequate technical education and the year had marked the inauguration of the National Diploma in Agricultural Engineering in which the Institution had played a prominent part. Candidates holding the diploma will be eligible for graduateship of the Institution and it is a qualification for corporate membership.

Activities in which the Norfolk Centre had played an active part included the formation of the Norfolk Farm Machinery Club in 1945, for fostering interest in the maintenance of farm machinery, and the organisation of training courses for farm machinery operatives. At every level, he pointed out, the Institution was playing its part in promoting a high standard of competence which could not fail to benefit not only the industry, but the nation.

Referring to professional responsibilities, he pointed out that the earth was the basis of life—not a source of exploitation—and the aim of agricultural engineers should be to produce adequate food for man and beast with unselfish stewardship of the land so that it might be passed on to posterity in improved heart. Agricultural engineers, he concluded, faced the future with a deep sense of responsibility and with a confidence that they would meet a challenge worthy of their highest ideals and their greatest efforts.

The BUYER'S *Column*

New Improved Grill-Boiler

A NEW improved 2 kW combined grill-boiler manufactured by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, will shortly be available. It provides a boiling plate measuring 10½ in. x 8 in., and is equipped with a 3-heat switch, grill pan, grid and deflector plate. The unit has a black vitreous enamel hob and cream finished body. Overall dimensions of the unit are: height, 7⅜ in., width, 17⅜ in., depth, 10¼ in.; grilling space, height, 5 in., width, 12 in., depth 9½ in. Cat. No. is D5741. Price £6 19s. 8d.

G.E.C.'s D5741 grill-boiler is neat and attractive

Price Changes

AN increase in price as from October 15 of 10% on their complete range of radiant boiling plates is announced by the BACKER ELECTRIC CO. LTD., Fitzwilliam Road, Rotherham, Yorks.

The ENGLISH ELECTRIC COMPANY LTD., Queens House, Kingsway, W.C.2, also announce an increase from the same date, in the price of their cooker Model 2009, which is increased to £35 10s. There is an additional charge of £1 15s. when the cooker is fitted with a pull-out drawer in the base.

THE POWER CENTRE CO. LTD., Lloyd St., Wednesbury, Staffs, also announce an increase in prices, the first general increase since 1949. New prices have been announced for the surface pattern cable trunking supplied by the company; these are set out in list PR1/51. Advances applicable to other products include trunking fittings, cable pin racks and accessories, busbar chamber and circuit clamps and sealing chambers and glands. These range from 52½% to 130% and take effect from September 1. It is also pointed out that carriage is now paid on orders of £10 value and over.

BRITISH NATIONAL ELECTRICS LTD., Charlton London, S.E.7, announce an increase in the price of the Model C49 cooker. The new prices are: Model C49 (2-plate), without drawer and fuses, £29 12s. Model C49 (3-plate) as above, £32 2s.

Reductions in price, however, have been announced by MULLARD LTD., Century House, Shaftesbury Avenue, W.C.2, who state that the list prices of certain photocells are reduced as follows: 90CG and 90CV £1 17s 6d; 90AV, 90AG, 20CV and 20CG £3 10s, and 20AV £5.

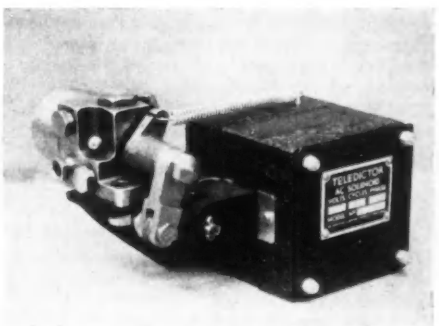
The price of the miniature Xenon-filled thyratron 2021 has been reduced from £1 2s 6d to 17s 6d, as have the prices of the following electronic flash tubes—LSD3 and LSD3A £4 10s, LSD5 £7, LSD7 £5, LSD8 £6.

Teledictor introduce A.C. Solenoids

NEW pattern solenoids for operation from a.c. supplies have been introduced by TELEDICTOR LTD., 214 Birmingham Road, Dudley.

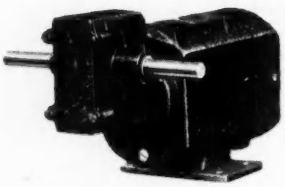
The Model A125 is the normal standard pattern, whilst the Model B125 which we have illustrated is the same unit, but is fitted with an end cheek having an additional bracket on to which a separate piece of equipment requiring actuation can be mounted. In this illustration the solenoid is shown controlling a pneumatic ¼ in. pilot valve. Either unit if so required can be fitted with hold-on contacts for interlocking on automatic sequence applications. High efficiency it is claimed is obtained by the magnetic circuit and the use of a high resistivity non-magnetic nickel-chrome alloy for the plunger guides, thus ensuring free running and a longer life for the moving parts.

Available for all a.c. voltages between 100 V and 500 V at normal frequencies, the units are designed so that all electrical connections are completely enclosed. These are made through a ¾ in. conduit entry. Dimensions of the unit are 4 in. by 3⅜ in. by 3⅜ in.; the plunger has a maximum stroke of 1¼ in., giving the unit a gross pull of 15 lb. at 85% line voltage.



Teledictor B125 A.C. solenoid

The Hillman Geared Motor Unit



NOW in production in the works of HILLMAN ELECTRICAL LTD. of 2 Northwood Buildings, Northwood Road, London N.16, the FH4G geared motor unit is an efficient machine capable of a long useful life. It is designed for use in automatic issuing machines, time and temperature controls and electronic apparatus.

The gear housing has been designed so that it can be easily adjusted to any position of 90°. A face plate on the gear box provides ready access for lubricating whilst the output shaft has self-oiling bearings.

At the non-driving end of the standard FH4 motor used in the unit a ball bearing has been fitted to take up possible end thrust. A redesigned and improved adjustable brush gear assembly has also been fitted.

Torque range is from 10 lb. in. to 2 lb. in. at various speeds from 400-50 r.p.m.

Hurseal add Unit and Bed Heaters

ADDITIONS to their well-known range of heating equipment just announced by HURSEAL LTD., Regent St., S.W.1, are an electric unit space heater, an electric bed sheet and a room thermometer.

The space heater is of the orthodox fan heater pattern designed for ceiling suspension. The air stream is controlled by individual adjustment of the front louvres, whilst a safety cut-out prevents the element overheating.

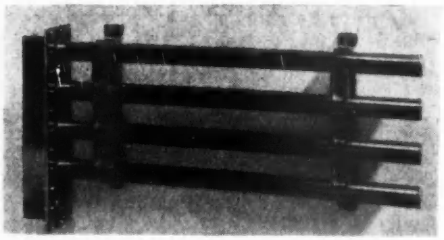
Available in three standard loadings, 2⅞ kW, 5¼ kW and 10½ kW. All heaters are said to be convertible for use on single or three-phase supplies. Voltage ranges are: 230/250 V single-phase—400/440 V three-phase, and 200/250 V single-phase—346/380 V three-phase. D.C. models are available.

The electric bed sheet is made in rayon in white and pastel shades. It is lightweight and washable though it cannot be ironed, and is perfectly safe, the element and connections being completely sealed and waterproof. Thermostatic controls ensure a uniform warmth at any required temperature. Size of the sheet, which is for 220/250 V supplies, is 60 in. by 33 in.

The room thermometer has a clearly marked pointer and dial. It is available in several colours at 17s. 6d.

Watertight Tubular Heaters

THE illustration on this page shows a development by THE ARORA CO, Rosebery Street, Loughborough, of their normal heavy duty tubular heaters as watertight units now being made to meet the requirements of Lloyd's Register of Shipping for hoseproof type heaters. Illustrated is a four-tier unit; they are also made in single, double and six tier or any other arrangement.



Arora's Four-tier watertight tubular heater

They are fitted with heavy duty elements and in view of the high loadings possible they can be used for other purposes than space heating, if required and are not subject to purchase tax.

TRADE PUBLICATIONS

LIGHTING UNITS. Two colour illustrated folders have been issued by Ekco-Ensign Electric Ltd., 45 Essex Street, W.C.2, dealing with the range of Ekco industrial and decorative fluorescent lighting fittings.

PLASTIC FABRICATION.—Permali News No. 2, an illustrated booklet issued by Permali Ltd., Gloucester, deals with contemporary uses for this interesting material.

ELECTRICAL MACHINERY.—"Lancashire Crypto in Industry" is a self explanatory booklet issued by Lancashire Dynamo and Crypto Ltd. Trafford Park, Manchester, 17. It deals as may be expected, with the equipment supplied by the group.

Opportunity for Buyers

AN excellent opportunity for buyers in the Home Counties Region presented itself last Tuesday and Wednesday when in the New Hall of the Royal Horticultural Society's spacious headquarters in Greycoat Street, Westminster, the Fourth London Regional display was staged by member firms of the Engineering Industries Association.

Chairman and vice-chairman of the London Regional Committee are both well-known men in the electrical and electronics industries respectively. They are Mr. P. L. Wilde (W. H. Sanders Electronic Ltd.) and Mr. J. P. Coleman (Gresham Transformers Ltd.). So it is not entirely surprising that over forty of the one hundred and thirty stands were devoted to equipment of great interest to the electrical engineer.

A new feature this year was the introduction of an exhibition of blueprints, prototypes, samples, etc. of work for which it was desired to find subcontractors who had suitable capacity and were willing to undertake the work.

THE WEEK

COMMERCE *in news* INDUSTRY

Diathermy and Television

THE British Radio Equipment Manufacturers Association is appealing to all users of electro-medical equipment to take advantage of the G.P.O.'s offer of help to prevent interference with television in the Holme Moss area. The G.P.O. is asking manufacturers to make all future equipment on frequencies outside the television band. For existing equipment it is suggested that manufacturers supply parts for the necessary alterations to be carried out. Besides altering the frequency, interference may be overcome by screening the apparatus with wire mesh.

The offer to advise on preventive measures before the complaint arises is a new departure by the G.P.O. who normally investigate interference only when it is reported.

Allocations of Nickel and Cobalt

THE International Materials Conference in Washington has announced the acceptance of the Manganese-Nickel-Cobalt Committee's recommendations, and plans for distribution of nickel and cobalt for the fourth quarter of 1951 will be put into operation at once. Of the 32 countries concerned the U.S. heads the lists, as in the case of copper and zinc, with 19,690 metric tons of nickel and 1212·4 of cobalt. Once again also Britain takes second place with 5,088 and 329·1 tons respectively. All countries concerned have been urged to adopt measures to eliminate non-essential uses and encourage substitution by other metals. They must also make their own arrangements to implement distribution.

Parsons Gas-turbine for N.G.T.E.

EXPECTED to be in operation by the end of next year is one of Britain's first gas-turbine power stations which is being built in Hampshire by the Ministry of Supply's National Gas-Turbine Establishment. This 10,000 kW set will be primarily an experimental plant, but it is anticipated that it will make some contribution to the national grid as well as supply power to the establishment. Waste heat given off by the plant will be used to heat the department's buildings.

The plant, made by C. A. Parsons Ltd., has been divided into two sections. A low-pressure 2,800 r.p.m. engine is to act as a booster, compressing air for the main high-pressure turbine which, at 3,000 r.p.m., will drive an alternator. Both run on kerosene or gas oil. We understand that the Ministry of Labour is seeking an engineer who must be an expert on both gas turbines and power generation, to take charge.

Rise in B.E.A. Borrowings

THE Treasury published last weekend its Statement of Guarantee given to the B.E.A. on September 12 in respect of temporary borrowings made by the Authority from clearing banks and Scottish banks up to October 31, 1951. The amount involved is £80 million and the guarantee replaces that given on July 6 last.

Health and Welders

COMPREHENSIVE enquiries into the possibility of ill-health arising from the welding process have been made recently by the Factory Department of the Ministry of Labour and National Service. The results, which are principally that welders do not suffer from any specific disease that could be described as "welders' disease," have been published by H.M. Stationery Office under the title: "The Health of Welders," price 3s. It is noted that electric welders may suffer from "arc eyes," but that this has no permanent effect on the vision. Electric welders also suffer to a greater extent than other workers from a slight superficial inflammation of the eyelids.

In the section on recommendations, it is pointed out that the main risk of ill-health amongst welders is due to fumes, the remedy being the obvious one of ventilation. It is, however, recognised that it is difficult to decide when and where special provision should be made in this respect. Close localised exhaust ventilation should be applied where articles are electrically welded on benches or stands. The investigation reported was carried out by Dr. A. T. Doig, H.M. Medical Inspector of Factories, and by Mr. L. N. Duguid, H.M. Deputy Chief Inspector of Factories.

First Half-Century

The L.C.C. contemplates putting electrically-controlled clocks in every important street in London, and also lighting them electrically at night. It sounds rather an expensive way of removing one excuse for entering a public-house, viz. to get the right time. Also, if the clocks be half as noisy as those shown at the Institution by Mr. Hope-Jones, our country cousins up in London will fancy themselves back in their native farmyard. Still the suggestion will do no harm and it may keep the London County Councillors out of mischief to amuse themselves by carrying it out.—*From our issue of October* 17, 1901.

The second of six 70,000 kVA generator transformers leaving the Witton works of the General Electric Co. for Uskmouth power station. The first was despatched a few months ago. It was partly filled with oil and weighed a total of 131 tons which necessitated rail transport. The removal of oil in this second instance reduced the weight to 110 tons, so that the trip from works to site could be made by road. Incidentally, the construction work seen in the background of the illustration is the extension to the company's factory, now nearing completion

Hon. Member of Radio Engineers

H.R.H. the Duke of Edinburgh appears to be taking an ever increasing interest in science. His outstanding debut as President of the British Association will linger for a long time in the memories of readers, who will also recall his acceptance a short time ago of the presidency of the City and Guilds of London Institute (see our September 27 issue). Following closely upon the above, the British Institution of Radio Engineers announced last week that the Duke has accepted honorary membership of the Institution. This organisation claims that it is the first of any other learned society to be so honoured.

Alleged Black Market in Metals

AT a meeting of manufacturers in Birmingham last week it was alleged that supplies of raw materials, urgently required for the defence programme, are being diverted to a black market. A resolution was passed urging that in view of the shortage and inequitable distribution and restrictions imposed by the Priority Treatment system of distribution, Government departments concerned should alleviate the position without delay. A Metals Committee was set up and instructed to appoint a deputation to wait on the Minister of Supply, and a "Capacity Gazette" is to be circulated in which members may advertise any surpluses.

Revision of Duty on Ipsophones

THE Board of Trade is considering the reduction of duty charged on apparatus designed for the automatic recording of telephone messages from 20% to 15% ad valorem. The Industries and Manufactures Dept. of the Board invites any representations from interested parties, which should be sent to Thames House North, Millbank, S.W.1, by November 3rd.

Radio and T.V. Index

IN SPITE of the fact that sales of both radio and television sets rose during August, the latest R.T.R.A. figures for that month, just published, show that they are still well below comparative sales last year. This may indicate a belated impact of the increase in purchase tax, or perhaps merely a late start to the new season, but in any case the opening of Holme Moss will probably stimulate television sales. The average number of sets sold per shop is as follows :

Month	1951	1950
Radio:		
July	7·24	9·07
August	7·54	10·31
Television:		
July	3·07	4·51
August	4·54	6·77

Summons against B.E.A. Dismissed

A SUMMONS alleging that the B.E.A. had contravened the Factory Act in not taking effective measures to ensure that an overhead travelling crane did not pass within 20 ft of workmen, has been dismissed by Croydon magistrates. Prosecuting, an inspector of factories said men were working on scaffolding plastering the catwalk which ran the length of the turbine hall at Croydon B power station. The crane's cabin overlapped about half the width of the platform and only a verbal warning was given to the men by the driver. It was held that the moment even one turbine was operating, the B.E.A. became responsible for whatever happened in the contractor's area.

Answering this, Mr. N. Black, for the Authority, said that machinery in the turbine house was being used for engineering and building construction and not for the generation of electricity. Also, the B.E.A. had never become occupiers of the contractors' area, the site had been handed over to the contractors and unless the B.E.A. were the occupiers they could not be held responsible. This submission was upheld.

Decca Chain Covers Europe

IT WAS announced by the Decca Navigator Co., Ltd., last week, that its licensees, Societe Francaise Radio-Electrique, have received a contract from

the French Government for the erection in that country of a chain of transmitting stations. The French chain is being constructed primarily as an aid to air navigation. Added to the chain of stations now nearing completion in Germany, it will extend the area to be covered by Decca from Czechoslovakia to the Atlantic coastline and from Scandinavia to the Mediterranean.

T.V. Inventor Honoured

WEDNESDAY next will see the unveiling in Soho of a plaque to commemorate the pioneer work in television done by John Logie Baird. The memorial is being erected on Monday by the L.C.C. and the unveiling ceremony will be performed by Sir Robert Renwick, president of the Television Society. The site in Soho is the front of 22 Frith Street, where in January 1926, Baird carried out the first demonstration of television before an audience consisting of some 40 members of the Royal Institution. The inventor died in 1946.

London Students' Dance

MEMBERS of the London Students' Section of the Institution of Electrical Engineers were given a good send-off for the 1951-52 session by the presence of the President of the Institution, Sir John Hacking, at their opening function, a dance held at the Victoria Halls, Bloomsbury Square. Addressing the gathering, Sir John spoke of the importance which the Council of the Institution attached to the students' sections, which helped train the men who would eventually carry on the tradition of the Institution. Sir John was accompanied by Lady Hacking, who presented prizes during the evening and by Mr. W. K. Brasher, C.B.E., Secretary of the Institution, and by Mrs. Brasher. Mr. J. N. Ratcliffe (Institution Staff) and Mrs. Ratcliffe were also present.

Two Firms Expand

INCREASED production has caused two firms to expand, we learn this week. Londex Ltd. have acquired a new factory in Croydon. This is a remarkable extension, and is indicative of the growth of the company, as it will be remembered that only two years ago they had to open a factory at Penge due to the inadequacy of their premises at Anerley. Londex now have three factories, therefore.

Flexible Non-Metallic Conduits Ltd. has been completely re-organised for increased production with a change of name to Gilflex Conduits Ltd. Formerly in Tottenham Court Road, London, the works and main stores will be located in Hertfordshire, and a trade counter at 41 The Parade, High Street, Watford. Main offices are also being moved to this address.

Lighting in the Motor Industry

CONTRACTORS and lighting engineers concerned with garages, service stations, showrooms, factories and the like, will no doubt find plenty of interest at Benjamin Electric's stand at the Motor Show. Among the fluorescent lighting range may be found a new reflector, being shown for the first time, known as the "Crysteel" vitreous enamelled type K.K. Flurolier. This is similar to type K., which made its debut at last year's show, but has been designed with slots on each sloping face of the reflector to provide an upward light component. It houses one 4 ft 40 W lamp. Also of interest is the sectioned Saaflux R.L.M. fitting, identical to that chosen for exhibition in the Festival of Britain's Hall of Illumination.

An impressive section of the display is the comparison drawn between ancient and modern lighting, as an Etruscan pottery lamp dating about 600 B.C. is exhibited beside one of the latest fluorescent units. The stand has been completed by photographs of the company's lighting installations in the motor industry.

Steel Allocation—Special Plans

A SPECIAL arrangement is being made under the new allocation scheme for steel, announced by the Ministry of Supply, for conduit and other steel required for electrical installation work. Members of the E.C.A. are being asked by the Association to submit their requirements for use on

Thorn Electrical Industries Ltd.'s floodlighting of the Royal Albion Hotel, Brighton, employing their colour fluorescent lighting technique. In all 24 units were used, each containing three coloured fluorescent lamps controlled from four dimmer boards of the automatic pattern. On south and east frontages fittings were mounted on first-floor balcony, vertical throw being 40 ft, and on north facade floodlighting on either side of the porch threw to a height of 60 ft. Average load over whole installation was 3·6 kW

electrical work in building. Other contractors should submit their needs either to the Association or the Directorate General of Building Materials, Ministry of Works. It should be noted that small quantities of tubes and pipes, including electrical conduit, viz. up to 10 cwt., may be obtained without an authorisation, but on submission of a M.o.S. certificate.

In general the new allocation scheme will be the same as that which was in force until May, 1950 when steel was decontrolled. Among the types of steel covered are tube, pipe, wire rod, tinplate and sheet under 3 mm thick but over 18 in. wide other than that having guaranteed specified electrical properties.

Export Licensing Changes

AMONG further changes in export licensing control, to operate under a B.o.T. Order from October 22, licences are now required for all destinations for iridium, palladium, rhodium, and their compounds and alloys containing such metals. In addition licences are now necessary for certain types of air conditioning machines, aluminium strip, certain types of turbines, and electrical machinery leak detecting instruments and strain gauging equipment and parts, for all destinations other than those specified in part II of the 3rd Schedule excluding Hong Kong.

Station Telephone Exchange

THE manual and automatic telephone exchange at Manchester's Victoria Station, installed in 1923, has been renewed and modernised at a cost of £27,000. Work was begun in March when a new manual switchboard was installed. The second stage was started in June and included the removal of all old equipment and the fitting of a new automatic exchange. Duplicate 500 amp 50 V "D.P." batteries, charged by a metal rectifier set, have been provided, and are operated on the "charge/discharge" principle. The whole exchange is illuminated now by fluorescent lighting. The equipment was manufactured and installed by the General Electric Co., Ltd.

E.I.B.A. Appeal for Help

A DETAILED examination on the part of industrial concerns and individuals of the contributions made so far to E.I.B.A. has been urged by Mr. C. R. King, the Association's president. He has asked that the industry try to do a little better and that regular subscribers endeavour to secure an additional contributor. The reason for the president's appeal is that demands on the Association's funds and services are growing fast, during the past year they have increased by some 24% while income rose by the inferior amount of 12%. All are asked to consider means of giving additional assistance.

I.E.E.'s Benevolent Fund

ALTHOUGH subscriptions and donations increased by £1,805 to £15,057 during the year 1950-1, the number of contributions dropped by 95, states the annual report of the Court of Governors of the I.E.E.'s Incorporated Benevolent Fund just published. The report will be circulated to all members with the October number of the journal. Other points in the report are that grants amounting to £7,777 were made to 115 beneficiaries, income from all sources for the General and Homes Funds and "Chesters" Trust, amounted to £17,928, and capital as at June 30 stood at £126,354, as compared with £116,601 last year.

Electrical Exhibition Takes Shape

THE first electrical engineers' exhibition being organised by the A.S.E.E. promises to be a successful venture, if recent reports as to bookings are an indication. As reported in our issue of August 30, the exhibition is due to take place at the New Royal Horticultural Hall, Westminster, on March 28 and 29 next year. Well over a thousand manufacturers have been invited to participate, and to date, in just over a month, about one third of the space has been let. Twenty-two firms, including the B.E.A., have so far taken positions and a further 33 have applied for information. Exhibition secretary is P. A. Thorogood, 35 Gibbs Green, Edgware, Middlesex.

Price Ruling Clause Criticised

ADDRESSING the Purchasing Officers' Association conference, Mr. Arthur Elliott criticised the "price ruling" clause whereby contracts were executed purely on the basis of cost plus a profit ratio. Nationalised corporations and ministerial departments should provide facilities for industrial consumers to enter into reasonable forward contracts, he said, so that the way was open to firm price trading which would lead to greater efficiency and higher production at less cost. Quotation of firm prices would obviate the need for price control orders and largely do away with black market trading. Mr. Elliott went on to say that industry was not free to move away from the protection of the price ruling clause until it could cover its commitments. Its major costs were fuel, power, transport, and imported raw materials, all controlled by Ministries or nationalised undertakings. The Council of the Association is to consider the whole question and recommend what action can be taken.

Visitors can test Speed of Light

READERS may recall an announcement last year to the effect that experiments at the National Physical Laboratory had shown that the normally accepted speed of light was inaccurate. The inaccuracy amounted to some 11 miles a second. The apparatus used in these experiments is now on show at I.E.E. headquarters in London and consists of a cavity resonator in which a radio wave is reflected backwards and forwards. When the time of travel equals the time interval between successive waves, they build up an electrical resonance which can be detected with very high precision. Visitors will be able to do this themselves as the apparatus will remain on view until November 30.

E.W.F. Council visit Scotland

THE Council of the Electrical Wholesalers Federation recently held one of its routine meetings in Scotland—at the Turnberry Hotel, Ayrshire. For the golfer there were two prizes presented by the President, Mr. George Cartwright, for a bogey competition. The winners were Mr. Bunting (R.C.M.A.) and Mr. W. H. Swain (E.W.F.), both returning a bogey card of 4 down. These two players also became the first joint winners of the Scottish Members Cup, to be competed for annually. Non-golfing visitors were shown places of interest in Ayrshire, and the visit was completed by a dinner under the chairmanship of Mr. J. Kinloch, which 80 members and guests attended. Altogether, it was a very enjoyable occasion.

Coach Tours of H.E. Schemes?

AT a hearing in Edinburgh earlier this month, the Scottish Licensing Authority was asked by the St. Cuthbert's Co-operative Association for permission to run a number of bus tours. The proposed routes include two to the Loch Sloy and Loch Tummel hydro-electric schemes. It was stated that there were no existing facilities for sightseeing tours of these projects and numerous applications had been received from organisations around the city for just such a tour. Objections were raised by the Scottish Omnibuses Ltd., Western S.M.T. Co., Ltd., and British Railways, who stated that no demand had been experienced but facilities were available if required.

Diploma in Electrical Housecraft

THE inauguration of a diploma for efficiency in electrical housecraft was announced by Lady MacColl, chairman of the Scottish Council of E.A.W., at the first annual dinner held by the Aberdeen branch since its post-war revival. Apart from encouraging girls to take up careers in the field of electricity, the certificate would also be available to the housewife. A further important aim in this respect was to teach women in the home when to leave electrical apparatus alone and call in the qualified electrician.

The Netherlands-Denmark Cable

IN our issue of October 4 we published an article on the Netherlands-Denmark submarine telephone cable link, and inadvertently omitted to point out that the submerged repeaters were specially made by Standard Telephones and Cables Ltd., who were also responsible for the terminal and auxiliary equipment.

NEWS IN BRIEF

An advisory panel on heavy duty engine oils has been set up by the Ministry of Supply.

Nearly 600 West Country motor and radio traders and their ladies attended the Exide and Drydex supper dance organised by Chloride Batteries Ltd., in Bristol.

The Old N'Ions Association, Northampton Engineering College past students' association, will be holding their 24th annual dinner and reunion at the Connaught Rooms, London, on November 30. Guests of honour will be Dr. W. G. Radley, engineer-in-chief, G.P.O., and Mr. Charles Ian Orr-Ewing, technical director, A. C. Cossor, Ltd.

Benjamin Electric Ltd. have produced a new show card for their "Coolicon" shades. It is 19 in by 14 in., strutted and mounted on strong board, and has a colour scheme of blue and black or white.

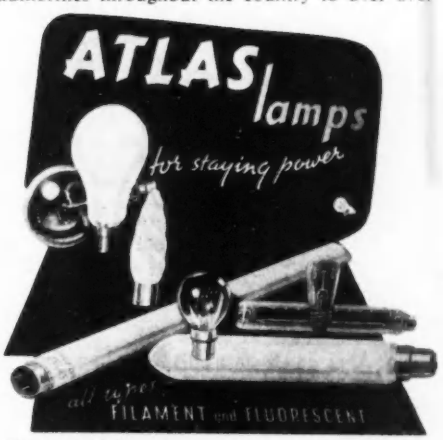
The third Mechanical Handling exhibition and convention to be organised in Britain is to take place at Olympia, London, between June 4 and 14 next year.

Work Saving Week, organised by Prof. John R. Immer, American expert on industrial management and materials handling, is to be held from November 19 to 23. Its aim to is make work easier by doing a job in the simplest way. Enquiries for details of the week itself and Prof. Immer's addresses should be sent to W. H. T. Tayleur, 1 Dover Street, W.1.

A few tickets are still available at £2 12s. 6d. for the E.I.B.A. ball on November 9 at Grosvenor House, London.

The rota system of power cuts for consumers of the N.W. Electricity Board will be brought into operation on October 29.

The Express Lift Co., Ltd., has recently received orders from the L.C.C. for 100 lifts for various housing estates in the London area. This brings the total number of lifts ordered by housing authorities throughout the country to over 670.



The latest Atlas cut-out sales aid produced by Thorn Electrical Industries Ltd. for dealers

Electric Supply News

Bideford

At an inquiry conducted by the Ministry of Fuel and Power recently, into an appeal against the proposal of the South Western Electricity Board to take an o.h. power cable across the River Torridge, near Upcott, Bideford Town Council contended the cable would harm the amenities of the vicinity. They urged that the line should be placed underground or in some less conspicuous place. For the South Western Board it was submitted that to have a submarine cable in an open line meant a weak link technically. The choice of the crossing point had been largely dictated by the contours of the area and any other position than that proposed would result not only in a greater length of overhead line, but would entail the erection of the more prominent steel lattice towers instead of the proposed wooden H-type pole. The result of the inquiry will be announced later.

Keswick

At a recent meeting of the West Lakeland District Committee of the North Western Electricity Consultative Council, Col. P. M. Hope, the Keswick representative and Coun. N. G., Barraclough, the Cockermouth representative, protested against alleged unfair treatment being meted out in the rural areas. Col. Hope contended that the Board's refusal to undertake any work which did not guarantee a 15 per cent. return on the capital was wrong. Of the capital available a definite proportion should be earmarked for rural development. The committee passed a resolution urging that supplies should be afforded to rural dwellers on less onerous terms than 15 per cent. guarantee.

Liverpool

Making steady progress towards restoring street lighting to its high pre-war standard, the City Lighting Department had 19,365 electric and 9,889 gas lamps lighted at March 31 last, according to the report of Mr. C. C. Smith, city lighting engineer. Nearly all the pre-war electric lamps have been re-lighted together with an additional 1,400 necessitated by development and conversions from gas. Of the total some 5,960 are operated by remote or centralised control from 59 control points. The Department also repairs and maintains the electrical and gas installations in corporation buildings and in the Mersey Tunnel, for which a new lighting scheme is in preparation.

Northern Ireland

Speaking in Belfast last Thursday on the occasion of the driving of the first pile at the site of a new power station by the Governor of Northern Ireland, the Prime Minister (Sir Basil Brooke) said it had been an established policy of the Government to attract new industries, especially to the rural areas. It had been a tremendous advantage when speaking of the attractions which Northern Ireland could offer the industrialist, to be able to say, "In Northern Ireland we can offer you a constant and uninterrupted supply of electrical current." Rural electrification schemes were well under way. The Ministry of Agriculture had a scheme in operation for granting loans to farmers for the purchase of electrical plant, and since the beginning of 1950 the Electricity Board had sanctioned the extension of electricity to some 6,800 farms and 8,750 other rural dwellings. They were grateful to the electricity undertakings for the fact that they had never yet had to suffer a power cut in Northern Ireland, he said, and much credit for this was due to the careful maintenance by the engineers responsible for plant which was well past retirement age. At the ceremony, Mr. F. C. Winfield, of Merz and McLellan, consulting engineers, spoke of the race against time to get the first set running—unless it was operating by 1953 there would be power cuts. It was also necessary to place orders immediately for plant for the later section.

Portobello

The B.E.A. has received consent of the Minister of Fuel and Power to the extension of Portobello power station (S.E. Scotland Division), by the installation of one 60 MW turbo-alternator and one 540 k lb/hr boiler. This authorisation covers the third of six 60 MW sets to be installed at Portobello. The first is already in commission; the installed capacity of the station is now 165 MW.

LIGHTING SCHEMES

Aireborough.—The M.o.T. has refused to sanction the installation of fluorescent lighting on the main road from Nunroyd Guiseley to Red Beck, Rawdon. The engineer and surveyor is to draw up a modified system providing for mercury-vapour lamps the whole length of the road.

Ilford.—The borough engineer has reported that the scheme for relighting Eastern Avenue from the borough boundary to the Green Gate, Horns Road, has been submitted to the M.o.T.

Macclesfield.—The lighting engineer has proposed that Buxton Road be re-lighted.

Middlesbrough.—The T.C. is to install electric lighting in Marton Road, at a cost of £4,000.

St. Helens.—M.o.T. has given preliminary approval to the proposed scheme for improving lighting on the trunk road through Prescot, at an estimated cost of £3,000.

Tottenham.—Improvement of the lighting in the borough's streets is to cost the council more than £13,000.

Tynemouth T.C.—Improvement Committee recommends invitation of tenders for supply and installation of 38 new electric street lamps in Billy Lane. Approximate cost of scheme is £2,944.

Wallsend T.C.—Ministry of Local Government and Planning has approved the erection of 73 electric lights in the Low Willington and Vic Namara Road estates at a cost of £2,439.

Company Activities

Britannia Electric Lamp Works Ltd.

Group profit for the year to March 31 last was £50,356 (*£29,165*), after charging taxation of £60,917 (*£33,640*). The dividend is again 12½% for the year.

Ferranti, Ltd.

For the year ended June 30 last, the consolidated trading balance amounted to £1,427,467, compared with £718,969 for the previous year. After charging depreciation, directors' remuneration, audit fees and adding investment income, the balance is £1,227,601 (*£550,995*). Taxation absorbs £687,472 (*£302,895*), leaving a net profit of £540,129 (*£248,100*), to which is added £91,385 (*£81,934*) brought in, making £631,514 (*£352,472*) available. After charging reference dividends, 6% Ordinary dividend, and transferring £450,000 (*£200,000*) to general reserve, there is a balance of £129,191 carried forward. In his statement, the chairman, Sir Vincent de Ferranti, points out that the output of the group is more than 30% above that of the previous year, and approximately 32% of the output has been exported. There has been a steady increase in orders received, and the company is left with a record order book of over £12,500,000. The output of power transformers, some 27% higher than last year, was again a record. The number of electricity meters produced was 43% up on last year, and sales of radio and television sets have been satisfactory. The Canadian company has substantially increased its turnover and profits, but the trading of the American company has again resulted in an adverse balance, although output has increased and substantial orders are in hand.

Holophane, Ltd.

The directors propose to capitalise £50,000 of general reserve for a bonus issue to the Ordinary stockholders on the basis of one 5s. unit for every two 5s. stock held. For the year ended June 30, the net profit was £88,424. After providing £51,250 for taxation and writing off £213 from the parent company's account there is a balance of £36,961 (*£43,457*). To general reserve £20,000, and off goodwill and patent rights £20,000. Final dividend 7½% making 15% (*both same*).

Max Stone

An extraordinary meeting is called for October 31, to consider a proposal to increase the capital to £600,000 by the creation of 560,000 6% Cumulative Preference shares of 10s. each, and 1,100,000 Ordinary shares of 2s. each. For the year to June 30 last, the consolidated trading profit, plus interest, was £267,261 (*£239,036*). Depreciation absorbs £17,338 (*£13,423*), deferred repairs £4,092 (*£2,405*),directors' and auditors' emoluments £22,179 (*£25,545*), taxation £134,690 (*£113,616*), leaving a net profit of £88,962 (*£84,047*). To general reserve £60,000 (*same*), dividends £22,740 (*£23,760*), leaving £57,465 (*£51,243*) carried forward.

Radio and Television Trust

The year to March 31 last resulted in a group loss of £49,787, against £27,010 for the previous year. After crediting taxation recoverable, etc., the adverse consolidated balance carried forward is reduced to £821,659 of which £807,182 is the parent company's carry forward.

Scottish Cables (South Africa) Ltd.

Due to an unfortunate printer's error last week, the trading profit was incorrectly given as £173,005 instead of £123,005.

Solus Teoranta

This Irish lamp-making concern showed a profit of £30,440 (*£22,354*) for the year ended June 30 last. To depreciation £8,510 (*£7,670*), and taxation £9,500 (*£7,000*). After payment of 10% dividend plus bonus 2½%, and placing £3,000 to reserve, there is £4,554 (*£4,061*) carried forward.

Strand Electric Holdings

Consolidated gross trading profit for the year ended April 30 last was £273,894 (*£235,833*). Depreciation takes £4,431 (*£3,164*), and taxation £34,850 (*£27,546*). To general reserve £7,000 (*£12,000*), hire stock reserve £1,714, retained by subsidiary £1,776 (*£1,097*), and the dividend is again 17½%.

Sudan Light & Power Co.

For 1950, the remuneration as managers of the public services in Khartoum, plus bank interest, amounted to £35,390 (*£52,244*). The sum of £1,000 (*nil*) is contributed to welfare fund, less recovered from debenture and loan interest adjustment £16,136 (*£22,500*), leaving a balance of £18,253 (*£29,744*). The Preference dividend absorbs £1,859 (*same*), the 7½% on the Ordinary, £15,986 (*£16,747*), to general reserve nil (*£10,000*), leaving £45,912 (*£45,504*) carried forward.

Wad Medani Light & Power Co.

Net revenue, etc., for 1950 was £15,239 (*£16,412*). Depreciation takes £4,497 (*£3,216*), loan interest £1,248 (*£928*), directors' and audit fee £290 (*same*), income tax £4,000 (*£3,500*), leaving a balance of £5,203 (*£8,478*). To gratuity fund £374 (*£361*), Preference dividends aggregate £4,275 (*£5,500*, to betterment fund £350 (*£412*), rebate to Sudan Government nil (*£1,724*), leaving £4,061 (*£3,856*) carried forward.

Dividends Declared

Babcock and Wilcox.—Interim Ordinary dividend of 7½% (5%). The increase is solely to relate it more closely to the final distribution.

British Aluminium.—Interim Ordinary dividend of 4% (*same*) on the increased capital.

Brush Electrical Engineering Co.—Interim Ordinary dividend of 4% (*same*).

Calcutta Electric Supply Corpn.—Interim dividend of 3% tax free.

River Plate Electricity and Other Securities.—Interim of 3% (*same*).

Commercial Information

CONTRACTS OPEN

HOME

Oct. 19.—West Riding. Electrical installation at detective training school, Wakefield. County Architect, Bishopgarth, Westfield Rd., Wakefield.

Oct. 20.—Greenock T.C. Electrical work in erection of 21 houses and extension to women's hostel in Westburn Square. Application by above date to Master of Works, Municipal Buildings.

Oct. 20.—Sutherland. Electrical work in erection of additional accommodation at Dornoch Academy. County Architect is E. W. Brannen, Carnegie Bldgs., Dornoch.

Oct. 22.—Feeny (Co. Derry). Installation of electrical heating in Presbyterian Church at Feeny. S. G. M. Craig, Esq., Drumcoritt House, Feeny, Derry.

Oct. 22.—Romford. Lighting is included among works in Tennyson Rd. Borough Engineer and Surveyor, Town Hall. Deposit £2 2s.

Oct. 22.—West Hartlepool T.C. Supply of 100 concrete street lighting columns with brackets for Class B and 28 for Class A lighting. Borough Engineer, Municipal Buildings.

Oct. 24.—Hull. Electrical installation to T.B. Holmes School. City Architect, Guildhall. Deposit £1 1s.

Oct. 24.—Lutterworth (Leic.) R.D.C. Wiring and installation work in 40 new houses. Engineer, Council Offices, Lutterworth, nr. Rugby.

Oct. 25.—Dewsbury T.C. Electrical installation in conversion of "Austin Friars" to hostel. Borough Architect and Buildings Surveyor, Town Hall. C.

Oct. 29.—Exeter T.C. Supply of switchgear for Pynes, waterworks. John Brierley, City Engineer, Surveyor and Water Engineer, Municipal Offices, 7 Southernhay West, Exeter.

Oct. 29.—Manchester. Supply and erection of a passenger lift at City Training College. City Architect, Town Hall. Deposit £1 1s.

Oct. 31.—Brighton T.C. Dismantling the existing passenger lift and installing a new one at the Town Hall. Borough Engineer and Surveyor, 26-30 King's Rd., Brighton.

Nov. 2.—Wiltshire. Provision and installation of electrical system in secondary modern school at Malmesbury. Applications to F. I. Bowden, County Architect, County Hall, Trowbridge, by Oct. 19. Deposit £2.

Nov. 3.—Longbenton U.D.C. Electrical installation in 16 houses at Benton (contract 26) and 10 bungalows at Annitsford (contract 27). A. E. Sweetman, Engineer and Surveyor, Council Offices, Forest Hall, Newcastle-on-Tyne. Deposit £2 2s.

Nov. 5.—Dewsbury T.C. Electrical work in proposed occupation centre at Savile Town. Borough Architect and Buildings Surveyor, Town Hall.

Nov. 6.—Derby T.C. Supply, erection and installation of Group A sodium discharge lighting along Queensway, trunk road A.5111. Borough Engineer and Surveyor, Council House. (Advertised in this issue.)

Nov. 7.—Sutherland. Electrical work in erection of 42 houses on various sites. Architect is E. W. Brannen, Carnegie Buildings, Dornoch. Deposit £1 1s.

Nov. 8.—Littlehampton U.D.C. Wiring to electric lighting and power points in 16 maisonettes. Engineer and Surveyor, Council Offices. Deposit £1 1s.

Nov. 9.—Bingley U.D.C. Tenders invited for (*a*) supply, erection and installation of 18 concrete lighting columns, lanterns and auxiliary equipment in Mornington Rd., and (*b*) erection and conversion of gas lighting columns and supply, erection and installation of 17 swan-neck brackets, lanterns and auxiliary equipment in Chapel Lane and Dubb Lane. J. S. Lattin, Engineer and Surveyor, Town Hall. Deposit £2 2s. in respect of each scheme. (See Oct. 4 issue.)

Nov. 13.—Ince-in-Makerfield U.D.C. Electrical installations in 40 houses on Battersby St. site. Surveyor, R. Lewis, Town Hall, Ince, Nr. Wigan. Deposit £1 1s.

Nov. 14.—N. Ireland. Electric lamps and other requisites are included among supplies required by Lagan Valley and Lisburn Hospitals during year beginning Jan. 1, 1952. Secretary, S. Antrim Hospital Management Committee, Dublin Rd., Lisburn.

Nov. 17.—Windsor T.C. Supply of electric lamps, fittings and cable during year ending Dec. 31, 1952. G. S. Baker, Borough Engineer, Kipling Memorial Building, Alma Road.

Nov. 30.—Salford. Supply of one 25-ft 3-section motor tower wagon mounted on ¾-ton Karrier C.K. 3. low-loading chassis. Street Lighting Superintendent, Bloom St., Salford 3. (Advertised in this issue.)

Dec. 7.—Belfast. Supply and erection of low pressure piping installation, including valves, auxiliary pumps, tanks, water softening plant, air compressor and associated equipment. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-on-Tyne. Deposit £5 5s. (Advertised in this issue.)

No date stated.—Alnwick (Northumberland) U.D.C. Conversion of part of town's street lighting from gas to electricity involving some 139 lamps. Apply to Surveyor, Council House, Wagonway Road.

No date stated.—N. of Scotland H.E. Board. Electrical installations at Errochty power station, Perthshire, covering lighting, heating and auxiliary cabling. Engineers are Merz and McLellan, 39 Northumberland St., Edinburgh 3. Deposit £2 2s. (See Sept. 27 issue.)

OVERSEAS

*Details of items marked * may be obtained on application to Room 1076, Board of Trade, Thames House, North Millbank, S.W.1, quoting reference.*

Oct. 30.—South Africa. Land Water Board require supply of high-voltage (6·6 kV) cable for Zuikerbosch pumping station, contract 779; also supply of low-voltage (660 V) cable for same, contract 780. Chief Engineer, Johannesburg. Deposit £(SA)3 in each case.

Oct. 31.—New Zealand. Supply of 18,000 yd. of power cable,

single-core, v.i.r. or equivalent, lead alloy sheathed for voltages not differing from earth by more than 250 V. Director-General (Stores Division), G.P.O., Wellington. B.o.T. (Ref.: CRE (IB) 72227/51).*

Nov. 6. — India. Shearing machine (to cut plates ½ in. thick) with electrical equipment for 400 V, 3-phase, 50 c/s a.c., and overhead type guillotine shearing machine (to cut ½ in. M.S. plates) with electrical equipment for 500 V d.c. Documents from Director-General of Supplies and Disposals, Shahjahan Rd., New Delhi. Deposit Rs. 7.

Nov. 8.—Australia. Sydney C.C. invite tenders for manufacture, supply, testing, erection, etc., of three 13,500 kVA 3-phase transformers having ratio of 33,000/10,850 V, for Holroyd No. 2 substation. C.C. is at Queen Victoria Building, George St., Sydney. B.o.T. (Ref.: CRE (IB) 72547/51).*

Nov. 9.—Brisbane. Supply of 425 tons of hard drawn bare copper cable, of high conductivity electrolytic copper for City Council. Town Clerk, City Hall. B.o.T. (Ref. CRE (IB) 72756/51).*

Nov. 9.—S. Rhodesia. Supply of three diesel-driven electric welding machines for Central Mechanical Equipment Dept., S. Rhodesian Govt. B.o.T. (Ref.: CRE (IB) 72411/51).*

Nov. 14.—India. Supply of 8 in. stroke high production slotting machine with electrical equipment for 400 V 3-phase 50 c/s a.c. Documents from Directorate General, Supplies and Disposals, Shahjahan Rd., New Delhi. Deposit Rs. 3.

Nov. 19.—Uruguay. Usinas Electricas y Los Telefonos del Estado invite tenders for large quantity of electricity meters. They are required for a.c., single-phase and 3-phase destined for 3-wire distribution network without neutral. B.o.T. (Ref. CRE (IB) 71950/51).*

Nov. 23.—Ceylon. Tenders invited for supply of (among other items) five diesel electric generating sets 5 kW, and one portable set 20 kW. Documents from Director of Irrigation, P.O. Box 500, Secretariat, Colombo. Deposit Rs. 100.

Nov. 30.— India. Supply of one 7,500 kW set and two 40/50,000 lb per hour boilers with auxiliary equipment for Utran power house. Chief Engineer Electric Grid Offices, Mercantile Bank Building, Bombay. B.o.T. (Ref. CRE (IB) 72063/51).*

Jan. 3, 1952.—South Africa. Tenders invited by Rand Water Board (contract 775) for supply, erection and commissioning of three electric motor-driven main pump sets and booster pumps for Zwartkopjes pumping station. Chief Engineer, Johannesburg. Deposit £(SA)3.

Jan. 11, 1952.—Brisbane. Supply of six 5,000 kVA, 3-phase, 50 p.p.s., 33 kV delta to 11,000/6,350 V star, step-down, outdoor type distribution transformers for City Council B.o.T. (Ref. CRE (IB) 71898/51).*

No date stated.—Ceylon. Tenders to be invited shortly for construction of Stage 11A of the H.-E. scheme at Watawala. Section C of this involves electrical and mechanical plant in extension to Laksapana station and 3 substations including three 12,500 kW alternators, 66 kV, 11 kV and 400 V a.c. switchgear with control gear and cables, 66 kV, 33 kV and 400 V switchgear and oil purifiers, transformers, arc suppression and decoupler coils, voltage boosters, lighting arresters, fire fighting equipment, etc. Section D includes 3 66 kV transmission lines of 18, 18 and 52 miles in length. Applications to Crown Agents for Colonies, 4 Millbank, S.W.1, by Nov. 21. (Advertised in this issue.)

CONTRACTS PLACED

Aylesbury. First stage of electrical installation at St. John's Hospital, Stone, Electrical Installations Ltd., £4,251.

Chelsea. Installation of main electrical switchgear and cables at St. Stephen's Hospital, William Steward and Co., Ltd., £4,232.

Dudley T.C. Electrical installation in further 289 houses, Goldsmith and Cantrill, £6,493.

Folkestone T.C. Wiring of 40 houses on Biggins Wood estate, G. D. Edwards, £1,157.

Glasgow T.C. Electrical work at Notre Dame high school for girls, Osborne and Hunter, £7,049.

Lowestoft T.C. Electrical installation in 46 houses on Whitton estate, Eastern Electricity Board, £1,092.

West Hartlepool T.C. Supply of 250 street lighting lanterns with Perspex bowls, Metropolitan-Vickers Electrical Co., Ltd.

Your Queries — Answered

Socket outlets incorporating mercury switches, makers of? W.L.—Wandsworth Electrical Mfg. Co. Ltd., 32 Frederick St., Birmingham 1; Walsall Conduits Ltd., Excelsior Works, West Bromwich. (21674)

"Tempo" pressure cookers, makers of? T.B.—Almag. Eng. Co. Ltd., 46 Pembridge Rd., W.11. (21682)

Shoe trees, electrically heated, makers of? H.V.—Ronning & Co., 7 York Place, Adelphi, W.C.2. (21704)

"Autolux" irons, makers of? E.P.—These irons were marketed by Marks & Spencer Ltd. who have informed us that this appliance is no longer being made. They cannot supply spares, although they will replace irons still in the guarantee period. Replacement elements should be available from most of the element manufacturing firms. (21698)

"King Dick" vacuum cleaners, makers of? W. T.—Abingdon King Dick Ltd., King's Rd., Tyseley, Birmingham 11. (21709)

Handlamps, 3 colour, for railway signalling, makers of? C.E.—Watts Fincham (1935) Ltd., 9 St. Helens Place, E.C.3. (21716)

The above are selected from questions we have answered this week. If you have a query, send it to us.

ANSWER WANTED

Bronchitis kettles, makers of? G.D. (21725)

TRADE NOTES

Change of Address. The Sales Department of Sunvic Controls Ltd., is now at 132-135 Long Acre, W.C.2. (Tel.: Temple Bar 9591), to which address orders and enquiries should be sent. As from October 22, goods for repair should be sent to the firm at No. 1 Factory, Eastern Industrial Estate, Harlow New Town, Essex. The Accounts Department remains at Long Acre, and the registered office at 10 Essex Street, W.C.2.

Service Depot. E. K. Cole Ltd. announce that facilities for T.V. service at their Manchester Depot at 55 Whitworth St. have been considerably extended and new benches and equipment installed.

Arrangement. Sunvic Controls Ltd. have arranged to manufacture and sell the range of pneumatic process control instruments produced by Moore Products Co., of Philadelphia, U.S.A.

New Branch. Johnson & Phillips Ltd. announce that their branch at Ipswich has been transferred to larger premises at 17 St. Nicholas Street. (Tel.: Ipswich 3417, Telegrams: "Selbac," Ipswich.)

PRICES OF CABLE METALS AND OTHER MATERIALS
(at Tuesday night)

	£ s. d.	New York price
COPPER, electrolytic	227 0 0	£220 0 0
LEAD, good soft pig (foreign)	175 0 0	152 0 0
,, ,, ,, ,, "English" quality	176 10 0	
Tin (99·99·75%) ... ...(Cash)	1025-1030	—
,, (3 months)	970-972½	—
ALUMINIUM, commercial purity (del.)	124 0 0	—
ZINC	190 0 0	156 0 0
ARMOURING:		
Galv. Steel Wire (0·104 in.)	55 5 0	—
Mild Steel Tape (0·04 in.)	32 5 0	—

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Auralite. 698,485. Class 11. Lighting fittings. Holophane, Ltd., Holophane House, Elverton St., Vincent Sq., S.W.1.

Bank-lite, 699,130; **Banko-lite,** 699,132; **Bankolite,** 699,134. Class 9. Insulated electric cables and block and socket switches and 699,131, 699,133 and 699,135. Class 11. Hand lamps and lamp holders. Bankes and Lovelace, Ltd., 23 Old Burlington St., W.1.

Beldray with design. 700,535. Class 9. Electric flat irons. Bradley and Co., Ltd., Albion Works, Mount Pleasant, Bilston, Staffs.

Cathoweld. 700,813. Class 7 Portable electric welding machines. 700,814. Class 9. Welding apparatus. G. K. Lancaster (London), Ltd., 50 George St., Croydon, Surrey.

Freezone. 699,274. Class 11. Refrigerators, refrigerating apparatus and installations. Marco Refrigerators, Ltd., Manor Works, Rowan Rd., Streatham Vale, S.W.16.

Hoklykem. 697,283. Class 9. Electro-plating machines, resistance boards, batteries, soldering irons, etc. Hockley Chemical Co., Ltd., 1 Hockley Hill, Birmingham 18.

GAZETTE ANNOUNCEMENTS

Private Arrangement

William Henry Hough, 32 Victoria Rd., Fenton, Stoke-on-Trent, electrical contractor. At meeting of creditors statement of affairs showed liabilities amounting to £2,405. Assets estimated to realise £1,834, and after allowing £33 for preferential claims, there were net assets of £1,801, or deficiency of £604. Creditors resolved that debtor be requested to execute Deed of Assignment in favour of P. J. Snow, of Messrs. Bourner, Bullock & Co., C.A., Hanley, Stoke-on-Trent, as trustee of the estate. Committee of inspection was also appointed.

COMPANIES ACTS

Tok Switches Ltd. Meeting of members to be held at 11 Ironmonger Lane, E.C.2, on Nov. 20 at 10.15 a.m., to receive liquidators report.

S.I.M. Electrical Co. Ltd. Resolution for winding-up passed at meeting on Sept. 24. O. A. Watson, Incorp. Acc., 10 Peacock Lane, Leicester, was appointed liquidator, to whom creditors should send particulars by Nov. 17.

Partnership Dissolved

Stafford. George L. Carless, and Walter Hickinbotham, trading as "Weldun," electric welders, at 59 Brick Yard Row, Aldridge. Partnership dissolved as from Sept. 17. All debts received and paid by G. L. Carless and William P. Hickinbotham, who will continue the business.

BANKRUPTCY ACTS

Intended Dividends

London. Charles F. Adams and Frank Harris, electrical engineers trading as "Swift Bros." at 351 Forest Rd., Walthamstow. Last day for receiving proofs, Oct. 26. Trustee is William Foy Cresswell, Sen. Official Receiver, Bankruptcy Buildings, Carey St., W.C.1.

Orders Annulled, Revoked or Rescinded

Lincoln. Clarence Welbourn electrical engineer and contractor, trading at 158 Hykeham Rd., Lincoln. Receiving order rescinded and order of adjudication annulled as from Sept. 18. Debts paid in full.

Receiving Order

Southend. Arthur J. Hardy, engineer and electrician, trading at 3-10 Pier Hill, Southend. Date of receiving order, Oct. 6 First meeting to be held at 3 Central Buildings, Matthew Parker St., S.W.1, on Oct. 23 at 12 noon, and public examination at Petty Sessions House, Alexander St., Southend on Dec. 6 at 11 a.m.

Appointment of Trustee

Derby. Hector William Sharp, electrical and radio engineer, trading as "Willdays" at 178 Osmaston Rd., Derby. Trustee is A. W. Hunter, C.A., 418-422 Strand, W.C.2.

BUSINESS PROSPECTS

HOME

Aberdeenshire. Approval granted for erection of first stage of Fraserburgh Academy to cost £136,015. Total cost of project estimated at £312,095.

Armagh. Approval being sought for building of 12 houses each at Cullyhanna, Jonesboro', Newtownhamilton and Whitecross, 10 at Bellele and 8 at Forkhill.

Aylesbury R.D.C. Eight houses to be built on each of seven sites and four on each of four sites.

Barnstaple T.C. Tenders to be invited shortly for erection of 20 houses in Gould Road.

Basford (Notts) R.D.C. Erection approved of 200 houses for miners at Calverton.

Belfast. It is proposed to build 138 flats in Antrim Road.

Bicester U.D.C. Plans approved for erection of 72 houses and 12 bungalows at Bicester North.

Boston T.C. Sanction has been received for council to borrow money for four 3-ton electric cranes and tracks at the Dock.

Bridlington T.C. Erection of 26 houses on West Hill estate. Borough Engineer, Town Hall.

Bootle T.C. Erection of 28 dwellings on Sterrix Lane site. Borough Surveyor, Town Hall.

Cardiff. The B.B.C. to build new Welsh headquarters at Llandaff at estimated cost of £300,000.

Chatham T.C. Erection of 30 bungalows on Wayfield and Chickfield estates. H. D. Peake, Borough Engineer and Surveyor, Town Hall.

Dagenham T.C. Approval received for erection of extensions to May and Baker, Ltd.'s premises in Rainham Rd. South, and construction of factory on Hainault Industrial estate by Tiffen and Bealer, Ltd.

East Grinstead U.D.C. A total of 50 dwellings to be erected on Blackwell Farm estate. B. J. Cornelius, Surveyor to Council, East Court.

Edinburgh. Dean of Guild Court has approved erection of primary school at Carrick Knowe at estimated cost of £120,000. Also additional storey to be built at Western General Hospital.

Exeter. First stage (£10,000) of erection of police headquarters and courthouse has been included in the 1952 building programme.

Farnborough U.D.C. Thirty houses to be built on Empress estate for officers of Royal Aircraft Establishment.

Hampshire. Primary schools to be built at Eastleigh and Havant. County Architect, The Castle, Winchester.

Hornsey B.C. Erection of 22 flats on two sites. G. A. Pentecost, Borough Engineer and Surveyor, Town Hall, N.8.

Ipswich T.C. Erection of 56 flats and 18 houses on Maidenhall estate. Borough Surveyor, 19 Tower Street.

Jarrow-on-Tyne T.C. Construction of 18 flats in High St. at a cost of £21,000. H. W. T. Perkins is the borough engineer.

Long Eaton (Notts) U.D.C. Tenders to be invited for construction of 36 houses.

Maesteg U.D.C. Erection of 80 houses on Turberville estate. Lewis W. Jones, Engineer and Surveyor, Council Offices.

Maidenhead T.C. Plans approved for construction of coach station in York Rd. for Thames Valley Traction Co.

Melksham (Wilts) U.D.C. Plans approved for erection of 36 houses.

Milford Haven U.D.C. Erection of 34 houses on Hill estate. Engr. and Surveyor, Town Hall.

Mirfield U.D.C. Tenders for "all or separate trades" invited in erection of 20 houses on Kitson Hill estate. Engineer and Surveyor, Council Offices.

Mitcham (Surrey). X-ray department and chest clinic has been proposed for Cumberland Hospital to cost £22,000.

Norwich. It has been proposed to build a £161,030 girls' secondary school in Bluebell Rd.

Nottingham. Erection of six new schools has been included in next year's building programme.

Padiham U.D.C. Construction of 100 houses. W. Veevers, Clerk of the Council, Town Hall, Padiham, near Burnley.

Plymouth. Application likely to be made to borrow £180,201 for erection of Burleigh secondary modern and Lipson primary school. Approval sought for reconstruction of Guildhall and remodelling of Law Courts. Also erection proposed of 28 dwellings in Croydon Gardens and 24 in Rochfort Crescent.

Portslade (Sussex) U.D.C. Erection of 54 dwellings in two sections on Mile Oak (Valley) site. Council's Architects, Geo. W. Warr and King, 137 Albion St., Southwick.

Prescot (Lancs) U.D.C. Tenders likely to be invited shortly for construction of 56 houses in Shaw Lane and 14 flats in St. James Rd.

Preston T.C. Erection of county primary school on Larches estate. Borough Engineer and Surveyor, Municipal Building.

Redhill (Surrey). Outpatient department and office block estimated to cost £117,700 will probably be built at Redhill County Hospital.

Sandy (Beds) U.D.C. Plans approved for erection of 44 houses on Roods site.

Sheffield. Erection of secondary modern school at Greenhill. W. G. Davies, City Architect, Town Hall.

Southampton T.C. Erection of Heathfield county primary school at Sholing.

Tandragee (Armagh) R.D.C. Construction of 35 houses at Tullyhugh. Ogilby and M'Cutcheon, Quantity Surveyors, Lombard St., Belfast.

West Ham. Construction of 26 maisonettes in Plymouth Rd. and 15 houses, 11 flats and 30 maisonettes in Village St. Thomas E. North, Borough Architect and Planning Officer, 70 West Ham Lane, E.15.

Wilmslow U.D.C. Construction of 74 houses at Lacey Green. A. J. Riley, Engineer and Surveyor, Council Offices, Green Hall, Wilmslow.

OVERSEAS

Canada. Mumford Medland, Ltd., 576 Wall St., Winnipeg, are interested in the possibility of representing U.K. manufacturers of heavy electrical machinery in Western Canada. Interested firms should contact Mr. G. H. Craig at above address, direct.

Bolivia. Union Comercial Boliviana, Casilla 46, La Paz, would like to obtain agencies of U.K. manufacturers of refrigerators and sewing machines.

U.S.A. National Sanitary Service Inc., 6518 Ravenna Ave., Seattle, 5, Washington, wish to receive competitive offers for supply of ½ h.p. motors with casting comprising bell end of the motor, impeller, sweep and enclosing cone. Requirements are about 500 a month.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, London, W.C.2.

Globe Time Recorders Ltd., 91 The Headrow, Leeds. Mnfrs., assemblers, repairers, importers, and exporters of and agents for time recorders, electrically and mechanically propelled clocks, etc. Cap.: £200. Dirs.: P. Wood and A. E. Holloway.

Gurney's (Radio) Ltd., 109 The Broadway, Southall, Mdx. To take over bus. of retail radio, television and elec. engrs. carried on as "Gurney's" at Southall, Mdx. Cap.: £6,000. Dirs.: A. F. Trinder and Mrs. M. A. Trinder.

Harland Drives Ltd. Mech., elec. and hydraulic engrs., etc. Cap.: £25,000. Dirs.: To be apptd. by subs. Subs.: J. M. Armstrong, Kings Park, Adamton Terr, Prestwick, Ayrshire and D. M. Macarthur, 54 Southbrae Drive, Jordan Hill, Glasgow, W.3.

Hartley - Oerlikon Electrodes Ltd. 1a Harrington Rd., South Kensington, S.W.7. Mnfrs. of electrical welding electrodes and equipment, etc. Cap.: £100. Dirs.: R. G. Cooke and A. W. M. Hartley.

Herman Smith Smithlite Ltd., 46 Cherry St., Birmingham. Electrical and mechanical engineers, etc. Cap.: £10,000. Dirs.: H. G. Smith and H. M. Smith.

Homelab Instruments Ltd., 68a Cobden Rd., Leytonstone, E.11. To take over business of mnfrs. of instruments for the radio and allied industries carried on as "Homelab Instruments" at Leytonstone, E.11. Cap.: £500. Dirs.: C. Knox and R. F. Herbert.

Lindley Thompson Transformer (Holdings) Ltd. To acquire and hold shares, stocks, debentures and to carry on business of designers, manufacturers, importers and exporters of and dealers in electrical plant and machinery, etc. Cap.: £100. Dirs.: to be apptd. by subs. Subs.: Diana M. Holland and A. R. Normand, 11 Waterloo Place, S.W.1.

Metals and Cables Ltd., Derbyshire House, Belgrove St., W.C.1. Merchants of and dealers in scrap iron, tools and metals of all kinds, wire and cable dealers and manufacturers, etc. Cap.: £100. Dirs.: C. J. Platt, S. W. Platt, S. J. Barnett and J. Lowenstein.

MEETINGS TO NOTE

THURSDAY, OCT. 18

I.E.S. (Gloucester and Cheltenham Centre).—Annual dinner at G.E.C., St. Aldgate St., Gloucester, 6.15 p.m.

INSTN. OF HEATING AND VENTILATING ENGRS. (Birmingham Branch) "Pimlico District Heating Scheme." A. E. Margolis. Imperial Hotel, 6.30 p.m.

WORCESTER ELECTRIC CLUB.—"Electric Lamps." F. Jamieson. Talbot Hotel, Tything, 7.15 p.m.

I.E.E. (E. Midland Centre).—"Phase/Neutral System of Supply for h.v. Distribution." G. T. Garwood and G. J. Websdale. District meeting at Corn Exchange, Spalding, 7 p.m.

I.E.E. (S.W. Sub-Centre).—Chairman's address by S. C. Monk. Grand Hotel, Plymouth, 3 p.m.

I.E.E. (Irish Branch).—Chairman's address by B. O'Mougain. Trinity College, Dublin, 6 p.m.

FRIDAY, OCT. 19

A.S.E.E. (Crewe Branch).—"A.C. Motors and Control Gear." F. T. Bartho. Copeland Arms Hotel, Glebe St., Stoke, 7.30 p.m.

MANCHESTER ASSOC. OF ENGRS.—"Electrical Power Distribution in Factories." E. Jacks. Engrs. Club, Albert Sq., 6.45 p.m.

BIRMINGHAM ELEC. CLUB.—1951 Ladies' Evening at Grand Hotel, 7 p.m.

I.E.S. (Huddersfield Group).—"Light Colour and the Stage." E. E. Faraday. Tech. College, Queen St. South, 7.15 p.m.

I.E.E. (N. Staffs Sub-Centre).—"Application of Gas-Turbine Technique to Steam Power." J. F. Field, Midlands Elec. Board, Stoke-on-Trent, 7 p.m.

SATURDAY, OCT. 20

JUNIOR INSTITUTE OF ENGINEERS (N. Western). "Tme Recording", W. J. Thompson, 16 St. Mary's Parsonage, 2.30 p.m.

MONDAY, OCT. 22

I.E.S. (Sheffield Centre).—"Radiation, Lighting and Illumination." J. N. Aldington. University, Western Bank, 6.30 p.m.

I.E.E. (London).—Discussion on "Place of Electricity in a National Fuel Policy." Savoy Place, 5.30 p.m.

I.E.E. (Mersey and N. Wales Centre).—"Electrically Interlocked Guards on Machines." W. Fordham Cooper. Town Hall, Chester, 6.30 p.m.

I.E.E. (N.E. Centre).—"Performance of the British Grid System in Thunderstorms." J. S. Forrest. Neville Hall, Westgate Rd., Newcastle, 6.15 p.m.

I.E.E. (S. Midland Radio Group).—Chairman of Section's address by D. C. Espley. James Watt Memorial Inst., Birmingham, 6 p.m.

I.E.E. (Western Utilisation Group).—Chairman of Section's address by A. H. Young. Electricity House, Colston Ave., Bristol, 6 p.m.

A.S.E.E. (Sheffield Branch).—"Television." P. Williamson and C. O. Birtles. Royal Victoria Hotel, 7.30 p.m.

TUESDAY, OCT. 23

I.E.E. (London Measurements Section).—Chairman's address by F. J. Lane. Savoy Place, 5.30 p.m.

I.E.E. (E. Midlands Centre).—"Planning of an Electricity Board's Distribution System." G. O. McLean, Gas Showrooms, Nottingham, 6.30 p.m.

I.E.E. (N. Midland Centre).—Discussion on "Visual Aids—Help or Hindrance?" opened by D. Polak. L.S.B., Aire St., Leeds, 6 p.m.

I.E.E. (N.W. Supply Group).—"Transient Theory of Synchronous Generators connected to Power Systems." B. Adkins. Engrs. Club, Albert Sq., Manchester, 6.15 p.m.

I.E.E. (Scottish Centre).—"Protection of Electrical Power Systems." H. Leyburn and C. H. W. Lackey. 38 Elmbank Crescent, Glasgow, 7 p.m.

I.E.E. (S. Midland Centre).—"Determination of Time and Frequency." Humphry M. Smith. District meeting at Winter Gardens Restaurant, Malvern, 7.15 p.m.

INST. OF WELDING (N. London Branch).—Question Night at Slough Community Centre, Farnham Rd., Slough, 7.30 p.m.

WEDNESDAY, OCT. 24

PURCH. OFFICERS ASSOC. (Liverpool Branch).—Discussion on the Economic Situation. Exchange Hotel, 7.30 p.m.

I.E.E. (N.W. Radio Group).—Chairman's address by Prof. F. C. Williams. Engrs. Club, Albert Sq., Manchester, 6.30 p.m.

I.E.E. (N. Lancs Sub-Centre).—"Planning of Electricity Board's Distribution System." G.O.McLean. District meeting at Allen Tech. Inst., Kendal, 7 p.m.

I.E.E. (Southern Centre).—"Sutton Coldfield TV Broadcasting Station." P. A. T. Bevan and H. Page. Dorset Tech. College, Weymouth, 6.30 p.m.

THURSDAY, OCT. 25

I.E.S. (Bradford Group).—"Application of Modern Flash Discharge Tubes." C. R. Bicknell. Y.E.B., Sunbridge Rd., 7.30 p.m.

PURCH. OFFICERS ASSOC. (Yorks Branch).—"Responsibility of the Buyer in Industry." Gt. Northern Hotel, Leeds, 7 p.m.

I.E.E. (London Utilisation Section).—Chairman's address by A. H. Young. Savoy Place, 5.30 p.m.

I.E.E. (Scottish Centre).—"Lightning." Prof. F. M. Bruce. District meeting at Temperance Hotel, Lint Riggs, Falkirk, 7.15 p.m.

I.E.E. (Western Supply Group).—Chairman's address by E. N. Evans. Electricity House, Colston Ave., Bristol, 6 p.m.

A.S.E.E. (Kent Branch).—Film Show at Sun Hotel, Chatham, 8 p.m.

BRITISH RAILWAYS

SOUTHERN REGION

For their new Colour-Light Signalling-

Let Henley Cables carry the Current

British Railways Southern Region are now replacing semaphore mechanically operated signals between Battersea Park and Coulsdon North, by a colour-light system. Large quantities of HENLEY Cables are being used in the installation, and our picture shows Henley 26-core rubber insulated lead covered signalling cable being laid into concrete surface troughing, between Streatham and Streatham Common.

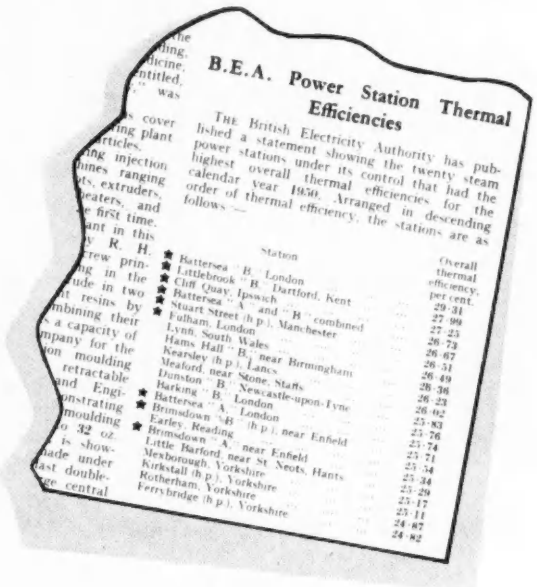
(British Railways photograph)

BY APPOINTMENT ELECTRIC CAP E MANUFACTURERS

HENLEY CABLES

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1

The Hall Mark of Efficiency



B.E.A. Power Station Thermal Efficiencies

THE British Electricity Authority has published a statement showing the twenty steam power stations under its control that had the highest overall thermal efficiencies for the calendar year 1950. Arranged in descending order of thermal efficiency, the stations are as follows :—

Station	Overall thermal efficiency, per cent.
★ Battersea "B", London	29·31
★ Littlebrook "B", Dartford, Kent	27·99
★ Cliff Quay, Ipswich "A" and "B" combined	27·23
★ Battersea "A", London	26·73
★ Stuart Street (h.p.), Manchester	26·67
Fulham, London	26·51
Lynn, South Wales	26·49
Hams Hall "B", near Birmingham	26·36
Kearsley (h.p.), Lancs.	26·23
Meaford, near Stone, Staffs.	26·02
Dunston "B", Newcastle-upon-Tyne	25·83
Barking "B", London	25·76
★ Battersea "A", London	25·74
★ Brimsdown "B" (h.p.), near Enfield	25·71
★ Earley, Reading	25·54
★ Brimsdown "A", near Enfield	25·34
Little Barford, near St. Neots, Hants.	25·29
Mexborough, Yorkshire	25·17
Kirkstall (h.p.), Yorkshire	25·11
Rotherham, Yorkshire	24·87
Ferrybridge (h.p.), Yorkshire	24·82

★ *Equipped wholly or mainly with Metrovick Plant!*

METROPOLITAN-VICKERS ELECTRICAL CO. LTD., MANCHESTER, 17, ENGLAND
Member of the A.E.I. group of companies

METROVICK *for complete electrical power schemes*

B/C103

CLASSIFIED ADVERTISEMENTS

OFFICIAL TENDERS AND APPOINTMENTS

WANTED · FOR SALE WORK WANTED

Those wishing to advertise in these pages should send the text to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia St., London W.C.2, before 10 a.m. on TUESDAY of week of issue. Official Displayed Advertisements are charged at 42s. per inch, and all other classified advertisements at 3s. 0d. per line. Situations Wanted will be published four times for twice the single insertion rate. Fee for Box No. and postage on replies is 2s.

TENDERS INVITED

CITY OF BELFAST

Electricity Department

LOW PRESSURE PIPING INSTALLATION—VICTORIA POWER STATION

TENDERS are invited for the supply, delivery and erection, etc., of low pressure piping installation, including valves, auxiliary pumps, tanks, water softening plant, air compressor, and all associated equipment.

Form of tender (No. N1024), conditions and specification, in quadruplicate, may be obtained from Messrs. Merz and McLellan, Consulting Engineers, Carliol House, Newcastle-upon-Tyne 1, on payment of a deposit of five guineas (cheques to be made payable to the Belfast Corporation Electricity Department) which will be refunded provided a bona fide tender be lodged and not withdrawn. Extra copies of the contract documents may be obtained at three guineas per set; this sum will not be returnable. The Corporation will consider only offers for the whole of the plant specified.

Each tender, in quadruplicate, in sealed envelope marked "Tender for Low Pressure Piping Equipment, Electricity Committee," and endorsed with the name and address of the tenderer, must reach the undersigned not later than 4 p.m. on Friday, December 7, 1951.

An official receipt must be obtained for each tender delivered by hand. Tenders sent by post should be registered.

The lowest or any tender will not necessarily be accepted.

JOHN DUNLOP,
Town Clerk.

City Hall,
Belfast.
October 11, 1951. (N 149)

COUNTY BOROUGH OF DERBY

STREET LIGHTING—TRUNK ROAD A.5111—QUEENSWAY

TENDERS are invited for the supply, erection and installation of SODIUM DISCHARGE LIGHTING to Group "A" standard on the above road.

The drawing may be seen and a copy of the specification and form of tender can be obtained at the office of the Borough Engineer and Surveyor, Council House, Derby.

Tenders must be submitted in the official envelope provided, endorsed "Street Lighting," and forwarded so as to reach the undersigned not later than 9 a.m. on Tuesday, November 6, 1951.

E. H. NICHOLS,
Town Clerk.

The Council House,
Derby.
October, 1951. (N 148)

CITY OF SALFORD

STREET LIGHTING DEPARTMENT

TENDERS are invited before twelve noon on Friday, November 30, 1951, for the supply and delivery of one 25-ft. 3-section MOTOR TOWER WAGON mounted on a ¾-ton Karrier C.K.3. low-loading chassis.

Copies of conditions of contract and specification may be obtained from the Street Lighting Superintendent, Bloom Street, Salford 3.

No tender will be considered unless received in a sealed envelope endorsed "Tender for Tower Wagon" and addressed to the Town Clerk, Town Hall, Salford 3.

H. H. TOMSON,
Town Clerk.
(N 132)

GOVERNMENT OF CEYLON

CEYLON HYDRO-ELECTRIC SCHEME, STAGE IIA—25,000 kW

TENDERS. Amended Notice. The Government of Ceylon will call for tenders shortly for the construction of Stage IIA of the Hydro-Electric Scheme at Watawala.

Under Stage IIA a seasonal storage reservoir will be provided by the construction of a mass concrete dam, 730 feet long, 130 feet high, near Castlereagh about 5 miles upstream from the existing Norton Dam, so that the stored water can be released under control.

Two further pipelines about 5,444 feet long will be provided. Each pipe will be 40 inches diameter at the head diminishing in diameter to 36 inches at the terminal anchor blocks where the two 36 inch pipes will bifurcate into two to form three 33 inch pipes connecting to the turbine inlet valves.

The electrical and mechanical plant is to be erected in an extension to the existing Laksapana Power House near Watawala and in substations at Nuwara Eliya, Kurunegala and Colombo; they include three waterwheels for direct coupling to three 12,500 kW alternators which latter should also be supplied, self-closing valves; 66 kV, 11 kV and 400 V a.c. switchgear together with control gear and cables for power house; 66 kV, 33 kV and 400 V switchgear and oil purifiers for substations and the receiving station; transformers, arc suppression and de-coupler coils, voltage boosters, lightning arrestors, fire-fighting equipment, etc.

A 66 kV transmission line with steel towers and cadmium copper conductors about 18 miles long will be erected from Norton to Nuwara Eliya and another about 18 miles long from Peradeniya to Kurunegala and a third about 52 miles long from Laksapana to Colombo.

The work enumerated above will be carried out in four sections, namely:—

Section A—Mass Concrete Dam at Castlereagh.
Section B—Pipelines.
Section C—Electrical and Mechanical Plant.
Section D—Transmission Lines.

Separate tenders will be invited for each of the four sections. A Memorandum setting out further details of the work involved will be issued to prospective tenderers on application to the Crown Agents for the Colonies, 4 Millbank, London S.W.1. Firms which propose to tender for one or more sections of the work should apply to the Chief Engineer and Manager, Department of Government Electrical Undertakings, Ceylon, through the Crown Agents for the Colonies, 4 Millbank, London S.W.1, on or before November 21, 1951, setting out their experience, resources, etc. The capability of these firms to undertake the work will be examined by a Board constituted for the purpose and such firms as are considered satisfactory will be requested to tender. (N 147)

APPOINTMENTS VACANT

BRITISH ELECTRICITY AUTHORITY

North Western Division

VACANCY No. 567

APPLICATIONS are invited for the position of STATION SHIFT CONTROL ENGINEER at Kearsley Generating Station, Stoneclough, near Manchester.

The salary for this position, which is superannuable, will be £699 to £728 per annum, in accordance with Grade 10, Class "K," of the N.J.B. Agreement, as revised.

Candidates should preferably possess technical qualifications and previous experience in a Generating Station is essential.

Applications, quoting vacancy number, stating age, qualifications and present position, should be addressed to the Establishment Officer, British Electricity House, Wilmslow Road, East Didsbury, Manchester 20, not later than October 31, 1951. (N 158)

SOUTH WEST SCOTLAND ELECTRICITY BOARD

Glasgow Sub-Area

APPOINTMENT OF GENERAL ASSISTANT ENGINEER (Meter, Test and Protection)

APPLICATIONS are invited for the position of General Assistant Engineer in the Meter, Test and Protection Section of the above Sub-Area.

Applicants should hold the Higher National Certificate or possess equivalent qualifications, and should have a sound knowledge of automatic protective gear with some experience in the commissioning and maintenance of such equipment.

The salary for the position will be in accordance with the National Joint Board Agreement, Class "K," Grade 13, at present £563 to £585 per annum. The appointment will be superannuable under the British Electricity Authority and Area Boards Superannuation Scheme.

Application should be made on the official form, which may be obtained from the undersigned, and which should be completed and returned not later than Friday, November 2, 1951.

JOHN CAIRNS,
Secretary.

75 Waterloo Street,
Glasgow C.2.
October 12, 1951. (N 152)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

ASSISTANT SHIFT CHARGE ENGINEER NORTHAMPTON POWER STATION

APPLICATIONS are invited for the appointment of Assistant Shift Charge Engineer at the above Generating Station.

Candidates should have had a sound general and technical education, and be experienced in the operation of modern steam power stations.

Conditions of service and salary will be in accordance with the National Joint Board Agreement, the salary being in Class "F," Grade 9, at present £538 per annum. Extension of plant now in progress will, when commissioned, raise the Station classification.

The appointment will be subject to the provisions of the Authority's Superannuation Scheme.

Applications should be submitted on the official form, which may be obtained from the Divisional Establishments Officer, British Electricity Authority, British Electricity House, Barker Gate, Nottingham, and should be returned not later than October 31, 1951.

L. F. JEFFREY,
Divisional Controller.
October 3, 1951. (N 98)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

APPLICATIONS are invited for the following appointment:—

JUNIOR ENGINEER—LUTON GENERATING STATION

Salary in accordance with Clause 35 of the N.J.B. Schedule "A" (revised), Class "E," Grade 15, £375, or Grade 14, £413 per annum, rising to a maximum of £426 per annum, depending on qualifications.

Applicants should preferably have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent. Previous experience with rotary converting plant and/or in a generating station will be an advantage.

The appointment will be superannuable in accordance with the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications, stating age, experience and present position, should be sent to the Divisional Controller, British Electricity Authority, Eastern Division, Northmet House, Southgate, N.14, to arrive not later than November 2, 1951. Envelopes should be endorsed "Junior Engineer—Luton."

W. N. C. CLINCH,
Controller.

Northmet House,
Southgate, N.14. (N 136)

THE NORTH WESTERN ELECTRICITY BOARD

SECOND ASSISTANT DISTRICT CONSUMERS' ENGINEER, WIGAN

APPLICANTS to have knowledge and experience of negotiations and relations with users and trade associations and housing authorities in the utilisation of electricity for domestic, commercial and agricultural purposes. Knowledge of industrial consumers' requirements an advantage. Supervision and organisation of Service Centres, including staff, publicity, etc. Technical training to Higher National Certificate an advantage. Salary scale £625 to £643, Grade F.7. N.J.B. conditions. Applications to Sub-Area Manager, No. 2 Sub-Area, The North Western Electricity Board, National Buildings, St. Mary's Parsonage, Manchester 3, by October 27, 1951. (N 142)

BRITISH ELECTRICITY AUTHORITY

Midlands Division

APPLICATIONS are invited for the appointment of DEPUTY POWER STATION SUPERINTENDENT at Hams Hall "B" Power Station (321 MW capacity) in accordance with Class "K," Grade 3, of the National Joint Board Agreement, commencing salary £1,157 per annum.

Candidates should possess either a University Degree in Engineering or be Corporate Members of the Institutions of Electrical and Mechanical Engineers, or hold equivalent qualifications. They should have a wide knowledge of large power station operation and in particular should have experience of pulverised fuel firing. The successful applicant will be required to assume full responsibility for the operation of the Station in the absence of the Station Superintendent.

Conditions of service will be in accordance with the N.J.B. Agreement and superannuation under terms approved by the British Electricity Authority.

Applications should be addressed to the Divisional Secretary, British Electricity Authority, 53 Wake Green Road, Moseley, Birmingham 13, and should be received not later than November 3, 1951.

F. W. LAWTON,
Divisional Controller.
(N 157)

BRITISH ELECTRICITY AUTHORITY

East Midlands Division

GENERAL ASSISTANT ENGINEER TRANSMISSION DEPARTMENT

APPLICATIONS are invited for the post of General Assistant Engineer in the Transmission Construction Department at this Divisional Headquarters.

Applicants should have a sound practical and theoretical training and considerable experience in the supervision or carrying out of Civil Works Contracts and will be expected to reside in the vicinity of the contract under supervision.

Salary will be in accordance with Class "AX," Grade 8, of the National Joint Board Agreement (£481-£619 per annum). The post is superannuable within the terms and conditions of the British Electricity Authority and Area Boards' Superannuation Scheme.

Applications should be submitted on the official form which may be obtained from the Divisional Establishments Officer, British Electricity Authority, Barker Gate, Nottingham, and should be returned not later than October 31, 1951.

L. F. JEFFREY,
Divisional Controller.
(N 99)

BRITISH ELECTRICITY AUTHORITY

Eastern Division

GENERATION ENGINEER (CONSTRUCTION)

APPLICATIONS are invited for the appointment of GENERATION ENGINEER (CONSTRUCTION) in the Eastern Division based at Divisional Headquarters in North London.

Candidates should have had first-hand experience of work involved in the design, layout and construction of new power stations or extensions to existing stations and should possess the highest technical qualifications in mechanical, electrical or civil engineering.

The successful candidate will be responsible to the Chief Generation Engineer (Construction) for work on the development of new power station sites, including their design and layout, as well as extensions to existing stations.

The salary for the appointment, which is superannuable, will be within the provisional salary range of £1,250 to £1,750 p.a.

Applications, stating age, full details of qualifications and experience, present position and salary, should be forwarded to D. Moffat, Esq., Director of Establishments, British Electricity Authority, British Electricity House, Great Portland Street, London W.1, so as to be received not later than November 3, 1951. Please quote reference AE 212. (N 141)

SOUTH EASTERN ELECTRICITY BOARD

Brighton and Hove District

FITTERS (ELECTRICAL) Three

WAGES 3s. 2½d. per hour for 44-hour, five-dayweek, under N.J.I.C. Agreement. Applicants should be experienced in the erection and maintenance of electrical machines, h.v. and l.v. switchgear and transformers.

Applications, giving two referees, must reach E. H. Skinner, M.I.E.E., Brighton and Hove Manager, SEEboard, Electric House, Castle Square, Brighton 1, by October 29, 1951.

A. L. BURNELL,
Secretary.
October, 1951. (N 150)

EASTERN ELECTRICITY BOARD

APPLICATIONS are invited for the following appointments:—

Chilterns Sub-Area 111/51 R.

Aylesbury District

DEMONSTRATOR OR HOUSECRAFT ADVISER

Applicants should have had a domestic science training including Electrical Housecraft, and should preferably hold the E.A.W. Certificate. They should be competent to plan and give cookery demonstrations including lectures and advice to consumers on the utilisation of domestic appliances. Previous experience in an Electricity Service Centre is desirable.

The salary for the appointment will be in accordance with Grade 1 (£360 by £20 to £440 p.a.) of the National Joint Council Salary Agreement.

A successful candidate having adequate experience and the additional qualification of the E.A.W. Diploma may, however, be appointed as Housecraft Adviser with a salary in accordance with Grade 2 (£440 by £20 to £500 p.a.) of the above-mentioned Agreement.

The successful candidate will be required to work Service Centre hours and live in the Aylesbury district.

Apply to the District Manager, Aylesbury, Eastern Electricity Board, Exchange Street, Aylesbury, Bucks.

Suffolk Sub-Area 110/51 R.

Woodland Substation, Badley, Stowmarket

THIRD ASSISTANT ENGINEER

Applicants should preferably have obtained the Higher National Certificate in Electrical Engineering or its equivalent, and have had a sound technical training in the construction, operation and maintenance of substations and overhead and underground systems up to and including 33 kV, together with experience of system control in a large rural area.

The salary for the appointment will be in accordance with Class "H," Grade 10 of the National Joint Board Salary Agreement, commencing at £621 per annum.

Apply to the Manager, Suffolk Sub-Area, Eastern Electricity Board, Finborough Hall, Stowmarket, Suffolk.

Future salaries and conditions of service for the above appointments will be in accordance with agreements made from time to time by the appropriate negotiating bodies.

The successful candidates will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Applications, stating age, education, qualifications and experience, with details of present appointment and salary, should be submitted to the Manager concerned within fourteen days of the appearance of this advertisement. (N 153)

CROWN AGENTS FOR THE COLONIES

ELECTRICAL FITTER required by the Nyasaland Government Electrical Services Department for one tour of 24 to 36 months with prospect of permanency. Commencing salary according to age and experience in scale £570, rising to £865 a year. Cost-of-living allowance between £20 and £126 a year, according to salary and dependants. Outfit allowance £30. Free passages. Liberal leave on full salary. Candidates under 35, must have served an apprenticeship to electrical engineering with a firm of manufacturers or an Electricity Supply undertaking, and possess some theoretical knowledge. They must be capable of erecting and maintaining low-tension and high-tension switchgear, transformers, motors and generators, and have had some experience of overhead or underground distribution work.

Apply at once by letter, stating age, full names in block letters and full particulars of qualifications and experience and mentioning this paper to the Crown Agents of the Colonies, 4 Millbank, London, S.W.1, quoting M.25647.B. on both letter and envelope. The Crown Agents cannot undertake to acknowledge all applications and will communicate only with applicants selected for further consideration. (N 125)

HIS MAJESTY'S COLONIAL SERVICE

APPLICATIONS are invited for the following post:—

DEVELOPMENT ENGINEER, POSTS & TELEGRAPHS DEPARTMENT (27323/36)—GOLD COAST. The duties are the preparation of plans for new telephone exchange and extensions to existing exchanges; underground cable development schemes; planning v.h.f. radio trunking systems; general supervision of detailed schemes of development of telephone communications. Appointment will be on contract gratuity terms for one tour in the first instance, at a salary of £1,600 per annum. Free passages are provided and a low rent is charged for furnished quarters.

Candidates should be A.M.I.E.E. and must have had extensive experience of similar development work.

Intending candidates should apply in writing to the Director of Recruitment (Colonial Service), Colonial Office, Sanctuary Buildings, Great Smith Street, S.W.1, giving brief details of their age, qualifications and experience. They should mention this paper and quote the reference number (27323/36). (N 151)

FOREIGN OFFICE ADMINISTRATION OF AFRICAN TERRITORIES

APPLICATIONS are invited for the undermentioned vacancies which have arisen in the Public Works Department under the Government of Tripolitania: (1) Ref. C621/51A. A MECHANICAL ENGINEER in charge of the Public Works Department Workshops. Candidates should be A.M.I.Mech.E. or similarly qualified, and should have had at least five years practical experience, including organisation and administration of mechanical workshops, care of machine tools, etc. They should have knowledge of mechanical road plant, and of boiler work and maintenance, and should be able to install and maintain small hot water systems. (2) Ref. D452/51/AO. AN ASSISTANT ELECTRICAL AND MECHANICAL OFFICER (Electrical) to take charge of a number of small provincial power sets, electrical distribution H.T. and L.T., and supervision of estimating and contracts. Candidates should be A.M.I.E.E. or similarly qualified with five years practical experience in electric generator and alternator running, small power stations and distribution systems. A knowledge of air conditioning and refrigeration would be an asset. The appointments carry a salary of £700 by £25 to £825 per annum. In addition a Foreign Service Allowance ranging from £130-£530 per annum, according to individual circumstances, is payable. Salary is not liable to U.K. Income-Tax (Schedule E) but would be liable to local tax at the rate of 8 per cent. Foreign Service Allowance is free of tax. Contracts (subject to medical examination) are for two years renewable by mutual agreement. Home leave is granted at the rate of 72 days for each two years resident service; local leave at the rate of 18 days annually. Leave passages for officials and their families, as well as passages on first appointment and on termination of contract, are at Government expense. Write for application form, quoting appropriate reference number, to the Ministry of Labour and National Service, Technical and Scientific Register, (K), York House, Kingsway, London, W.C.2. (N 145)

BRITISH ELECTRICITY AUTHORITY

North Western Division

APPLICATIONS are invited for the following superannuable positions at the new generating station, Huncoat, near Accrington, Lancs.

No. 583 MAINTENANCE ENGINEER (Electrical)

The salary will be £713 to £730 to £747 per annum, in accordance with Grade 6, Class "F" of the N.J.B. Agreement as revised at July 1, 1951.

Candidates, preferably Corporate Members of the Institution of Electrical Engineers, or holders of equivalent qualification, should have had a wide experience of power station electrical equipment, and practical experience of e.h.t. switchgear and protective gear.

No. 584 MAINTENANCE ENGINEER (Mechanical)

The salary will be £713 to £730 to £747 per annum, in accordance with Grade 6, Class "F" of the N.J.B. Agreement as revised at July 1, 1951.

Candidates, preferably Corporate Members of the Institution of Mechanical Engineers, or holders of equivalent qualification, should have had a wide experience in the maintenance of power station plant and be capable of taking control of a large maintenance staff, machine shop, and supervising turbine and boiler overhauls. A knowledge of the maintenance of instruments will be an advantage.

Applications, quoting vacancy number, stating age, qualifications, present position, and giving full details of education and experience, should be received by the Establishment Officer, Wilmslow Road, East Didsbury, Manchester 20, not later than October 31, 1951. (N 143)

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the position of SECOND ASSISTANT ENGINEER on the staff of the Generation Engineer (Construction) at Divisional Headquarters, Portsmouth.

Applicants must have had sound technical training as mechanical or electrical engineers and be corporate members of a recognised professional engineering institution, or hold suitable equivalent qualifications.

Experience in the construction of large generating stations is desirable, together with experience in a large manufacturing works. Operating experience in a modern generating station will be an advantage.

The salary will be in accordance with the National Joint Board Schedule "C," Grade 2, at present £809 to £1,000 per annum.

Forms of application may be obtained from the undersigned and must be returned not later than Friday, November 2, 1951.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street,
Portsmouth. (N 154)

BRITISH ELECTRICITY AUTHORITY

Yorkshire Division

KEADBY POWER STATION

APPLICATIONS are invited from suitably qualified chemists for the following positions at Keadby Power Station, near Scunthorpe:—

STATION CHEMIST

Applicants must have had previous power station experience preferably associated with pulverised fuel-fired high pressure boilers. Some previous experience of the control of modern water treatment plants would be considered advantageous.

Conditions of service and salary will be in accordance with N.J.B. Schedule, Grade 7, Class "G," £704 to £733 per annum.

SECOND ASSISTANT STATION CHEMIST

Good general analytical experience is required for this position, with special reference to the analysis and testing of coal, water and oil. Previous power station experience would be considered advantageous.

Conditions of service and salary will be in accordance with N.J.B. Schedule, Grade 11, Class "G," £553 to £576 per annum.

The power station will have an ultimate capacity of 360 MW. and will be equipped with pulverised fuel-fired boilers operating at 900 p.s.i.

The above appointments will be subject to the provisions of the Authority's superannuation scheme.

Forms of application may be obtained from the Divisional Secretary, British Electricity Authority, British Electricity House, St. Mary's Road, Leeds, 7, to whom completed forms should be returned within 14 days of the appearance of this advertisement. Envelopes to be endorsed "Station Chemist" or "Assistant Chemist".

G. A. VOWLES,
Divisional Controller.
(N 134)

BRITISH ELECTRICITY AUTHORITY

South Eastern Division

JUNIOR ENGINEER (Efficiency) at Kingston "B" Power Station. Applicants should preferably possess Higher National Certificate. Duties include assisting in plant investigations, testing and maintenance of technical records. Class "G," commencing at Grade 16, £400 per annum, and rising to Grade 14, £478 per annum.

GENERAL ASSISTANT ENGINEER (Efficiency and Plant Testing) based at Divisional Headquarters. Applicants should possess Higher National Certificate in Mechanical Engineering or equivalent qualification and should preferably have power station experience. Duties will be in connection with testing of boilers, turbines and associated plant, including cooling towers and the necessary calculations. Class "AX", Grade 8, commencing at £506 per annum.

N.J.B. conditions of service for both positions. Salaries quoted include London Allowance.

Applications, on forms obtainable from Divisional Secretary, B.E.A., S.E. Division, Lower Ham Road, Kingston-upon-Thames, to be received by October 31, 1951. (N 133)

BRITISH ELECTRICITY AUTHORITY

London Division

APPLICATIONS are invited for the following superannuable appointments:—

SHIFT CHARGE ENGINEER—

Taylors Lane Generating Station

Candidates should have technical qualifications up to Higher National Certificate standard, including thermodynamics as a subject, together with a good general education. Considerable experience in the operation of a modern Power Station is essential and must include experience on modern high-pressure plant and of switchgear connected with a large distribution system. Character and ability to deal with staff problems is important.

Salary and conditions in accordance with the revised N.J.B. Schedule, Class "F," Grade 7, plus London Allowance = £710 17s. 0d. per annum.

SHIFT CHARGE ENGINEER—

Bow Generating Station

Candidates should have technical qualifications up to Higher National Certificate standard, together with a good general education. Considerable experience in the efficient operation of turbo alternators and B. and W. boiler plants is essential. Character and ability to deal with staff problems is important.

Salary and conditions in accordance with the revised N.J.B. Schedule, Class "F," Grade 7, plus London Allowance = £710 17s. 0d. per annum.

SHIFT CHARGE ENGINEER—

Barnes Generating Station

Candidates should have had a sound engineering training. Technical qualifications preferably up to Higher National

(*Continued in next column*)

(*Continued from previous column*)

Certificate standard with experience in Power Station operation.

Salary and conditions in accordance with the revised N.J.B. Schedule, Class "C," Grade 7, plus London Allowance = £557 11s. 0d. per annum.

ASSISTANT ENGINEER (Handling)—

Taylors Lane Generating Station

Candidates should have had experience in Power Station operation and maintenance of coal and ash plants, together with a sound technical training.

Salary and conditions in accordance with the revised N.J.B. Schedule, Class "F," Grade 11, plus London Allowance = £554 8s. 0d. per annum.

ASSISTANT ENGINEER (Electrical Testing)—

Battersea Generating Station

Candidates should have received a sound practical training in electrical engineering, and have obtained some recognised technical qualifications.

The engineer appointed will be required to assist in the testing of all internal electrical equipment at the station, including protective gear on works auxiliaries, fault location, etc.

Salary and conditions in accordance with the revised N.J.B. Schedule, Class "L," Grade 16, plus London Allowance = £531 6s. 0d. per annum.

Applications for the foregoing vacancies, stating age, qualifications and experience, should be forwarded to the Divisional Secretary, British Electricity Authority, London Division, Ergon House, Horseferry Road, Westminster, S.W.1, to be received within 14 days of the publication of this advertisement.

J. N. WAITE,
Divisional Controller.
(N 156)

TRINIDAD & TOBAGO ELECTRICITY COMMISSION

SHIFT ENGINEERS

APPLICATIONS are invited for the appointments of shift engineers at the Commission's power stations in Trinidad.

The Port of Spain Power Station consists of 15,250 kVA of steam turbo alternators with water tube boilers 425 p.s.i., 740° F. and 7,400 kVA of diesel generating plant. The Penal Power Station will have an initial capacity of 10,000 kVA steam turbine plant, and the two stations will be interconnected through a 66 kV transmission line.

Applicants must not be more than 35 years of age, and have served an apprenticeship in mechanical engineering or a pupilage in a power station and have had subsequent experience in the operation of steam turbine and water tube boilers, experienced in the operation of diesel engines is desirable but not essential. Applicants must be capable of taking charge of a shift in any of the Commission's power stations after a short period in which to become familiar with the plant.

The salary of the appointment is in the scale, $2880 by $120 to $3,850 by $240 to $4,080 per annum ($1—$4.80 B.W.I.) (equivalent to £600 per annum increasing by £25 per annum to £300 per annum with one increment of £50 to £850 per annum), subject to satisfactory service.

Furnished quarters at moderate rentals (when available) or a rent allowance in lieu, are provided under the Commission's Regulations.

Free passages are provided for the officer and family, not exceeding four persons.

An outfit allowance of $288 (£50) will be granted on first appointment.

The appointment is subject to an agreement for three years in the first instance, and medical examination by the Commissioner's medical adviser.

The successful candidates will be required to sail in July-August, 1952.

Applications, endorsed "Shift Engineer, Trinidad," stating age, marital status, family, nationality, general and technical education, apprenticeship, appointments held, and full details of power station experience, with references, to be submitted to the undersigned within 21 days from the date of this advertisement.

PREECE, CARDEW & RIDER,
8 and 10, Queen Anne's Gate,
Westminster, S.W.1.
(N 112)

BOX No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London W.C.2

BRITISH ELECTRICITY AUTHORITY

Southern Division

APPLICATIONS are invited for the position of ASSISTANT SHIFT CHARGE ENGINEER at Swindon Generating Station.

Candidates should preferably possess technical qualifications leading to corporate membership of a recognised professional institution. Previous experience in a modern Generating Station is necessary, and manufacturing works experience will be an advantage.

The salary will be in accordance with Class "E," Grade 9, namely £567 to £579 per annum.

Forms of application may be obtained from the undersigned and must be returned not later than November 2, 1951.

P. D. A. OLIVER,
Divisional Secretary.

British Electricity House,
High Street,
Portsmouth. (N 155)

LONDON ELECTRICITY BOARD

ARCHITECTURAL ASSISTANTS.
ARCHITECTURAL DRAUGHTSMEN

APPLICATIONS are invited for the above positions in the Architect's Section of the Chief Engineer's Department in Central London.

Applicants for positions as Architectural Assistants should be studying for or have passed the Intermediate examination of the R.I.B.A., be capable draughtsmen and have had several years' experience in an architect's office.

Applicants for positions as Architectural Draughtsmen should be neat draughtsmen and preferably have had several years' experience in an architect's office.

The posts have been graded under Schedule "D" of the National Joint Board agreement as follows:—

(a) Architectural Assistants—Grade 5, £574/7/- to £683/11/- per annum, inclusive of London Area Allowance.
(b) Architectural Draughtsmen—Grade 6, £438 to £574/7/- per annum, inclusive of London Area Allowance.

Application forms obtainable from Establishments Officer, 46 New Broad Street, E.C.2, to be returned duly completed and stating grade applied for, by November 10, 1951. Please enclose addressed foolscap envelope and quote ref. V/1256/66/T on all correspondence. (N 126)

SOUTH WALES ELECTRICITY BOARD

SOUTH Wales Electricity Board require an ASSISTANT DISTRIBUTION CONTROL ENGINEER (Shift duties) at Control Centre, Fforestfach, Swansea.

Duties will involve assisting the Control Engineer in the operating of overhead and underground h.v. network, and applicants should have experience in operation of switchgear of all voltages, transformers and associated equipment, and be familiar with the working of safety regulations.

Applicants should have had a regular engineering training and should have at least the Ordinary National Certificate in Electrical Engineering. Salary in accordance AX/CX of the N.J.B. Schedule "C" (£375 to £536).

Applications, stating age, present position and salary, qualifications and experience, and giving three referees, to be addressed to the Secretary (Establishments), South Wales Electricity Board, St. Mellons, Cardiff, so as to reach him by October 27, 1951.

D. G. DODDS,
Secretary.
(N 135)

BOROUGH OF ILFORD

Borough Engineer's Department

APPOINTMENT OF A.P.T. III ELECTRICAL ENGINEERING ASSISTANT

APPLICATIONS are invited for the above appointment on the permanent staff of the Borough Engineer's Department at a salary in accordance with A.P.T. Grade III, viz., £500 by £15 to £545, plus appropriate London Weighting.

Candidates should preferably be Corporate Members of the Institute of Electrical Engineers, have served an indentured apprenticeship for electrical installation work with a reputable firm, and be capable draughtsmen with good experience in the preparation of schemes, specifications and estimates for all classes of electrical installation work. The duties will include the preparation of drawings, inspection of premises, and supervision of installations.

The appointment will be subject to one month's notice on either side, to the Local Government Superannuation Acts, the National Scheme of Conditions of Service and to medical examination.

Forms of application obtainable from the Town Clerk, Town Hall, Ilford, should be returned not later than November 5, 1951. (N 166)

A LARGE Electrical Engineering Company require a TRANSFORMER DESIGNER for work in a modern factory. Applicants should have experience of all types of distribution transformers. Excellent working conditions. Five-day week. Wide range of sports and social activities. Pension scheme in operation after qualifying period. There are facilities for housing in the case of successful candidates who are married.—Write, stating present occupation, age, and full particulars of experience, quoting Ref. GBE., to Box No. 1105, Electrical Times. (N52)

APPLICATIONS are invited from ELECTRICAL CONTRACTS ENGINEERS for handling orders for steel works installations and other metal industries projects, both as respects power units and associated control schemes. Preference will be given to applicants between 25 and 35 years of age who have served recognised apprenticeship, hold at least Higher National Certificate and have had previous manufacturing contractual experience. Permanent progressive positions, pension scheme. Successful applicants will have to find own accommodation, but for a limited period arrangements will, in appropriate cases, be made for special financial assistance.—Apply, stating age, qualifications, experience and quoting Ref. 489B, to Central Personnel Services, English Electric Co. Ltd., 24/30 Gillingham Street, London S.W.1. (N 138)

ASSISTANT ELECTRICAL ENGINEERS and PHYSICISTS required for the work connected with the development of rubber and plastic cables. Applicants should have the Inter B.Sc. or similar qualifications. Successful candidates will have the opportunity of obtaining experience in the evaluation and application of a wide range of dielectric materials and opportunities will be given for further study. Location of works: Leigh, Lancs.—Applications, in writing, should be submitted to: The Staff Officer, British Insulated Callender's Cables Ltd., Prescot, Lancs. (N 159)

COMPANY manufacturing diesel electric locomotives will accept applications for the following staff: DESIGN ENGINEERS and DESIGN DRAUGHTSMEN. Highly specialised in electrical and mechanical design and manufacturing procedure of d.c. traction generators, traction motors and control equipment. Also Draughtsmen experienced on similar work. Good salaries paid to men of first-class experience. Three years agreement. Every facility to find suitable accommodation will be given. Offers only to first-class men.—Box No. 1143, Electrical Times. (N 167)

DRAKE AND GORHAM (CONTRACTORS) LTD. have vacancy in their drawing office for DRAUGHTSMAN, age 21-25, with electrical contracting experience. Also JUNIOR, age about 16, for general drawing office duties. 5-day week. Hours, 9.30 to 5.30.—Write, giving particulars and salary required, to Chief Draughtsman, 36 Grosvenor Gardens, London, S.W.1. (N 87)

DRAUGHTSMEN and DESIGNERS with good experience in the light mechanical or radio engineering fields are required for work at Stanmore and Wembley. Applications, giving details of age and record should be sent to the Staff Manager (Ref. GBLC/151), Research Laboratories of the General Electric Co., Ltd., East Lane, North Wembley, Middlesex. (N 173)

DRAUGHTSMEN, JUNIOR and SENIOR, with overhead line or structural steelwork experience, required immediately for permanent position in D.O' Excellent prospects for suitable applicants.—Write' stating age and experience, to James Scott and Co. (Electrical Engineers) Ltd., (Transmission Dept.), 23 George IV Bridge, Edinburgh. (N 160)

DRAUGHTSMEN required, preferably with experience in any branch of high-tension and low-tension electrical switchgear, switchboard layout, and diagrams of connections, or electrical control gear. Applications from good mechanical draughtsmen and designers are also invited.—Apply, quoting "Switchgear" and stating age, experience and salary required, to the General Electric Co., Ltd., Engineering Works, Witton, Birmingham 6. (N 127)

ELECTRICAL ENGINEER, age 20-25, required for editorial staff of old established technical journal. Previous journalistic experience unnecessary, but must be fully qualified engineer. Superannuated position. State salary required.—Box No. 1141, Electrical Times. (N 165)

ELECTRICAL STOREKEEPER required with shop fitting experience. Write, giving age and particulars' to Box No. 1149, Electrical Times. (N 171)

EXPERIENCED ENGINEERS accustomed to the erection of lattice tower, concrete and wood pole overhead transmission lines and willing to serve either at home or overseas, age 25-45. Good prospects and pension. Apply in writing, giving full details to Staff Officer, British Insulated Callender's Construction Co., Ltd., 21 Bloomsbury Street, London, W.C.1. (N 137)

RUBBER TECHNOLOGIST required by old established firm of electric cable makers for technical duties in a north of England factory. Apply, stating age, qualifications, experience and salary required, to Box No. 1147, Electrical Times. (N 170)

FERRANTI LTD., Hollinwood Works, Manchester, have a vacancy in their Power Engineering Department for an ENGINEER to take charge of development work associated with the manufacture of power transformers of all sizes up to 500,000 V and 250,000 kVA, including all ancillary apparatus such as automatic voltage regulation and thermal control. The work includes the study of thermal, electromagnetic, and constructional problems and their application. The candidate should have a good degree and extensive experience in charge of development, preferably in an engineering manufacturing organisation, but not necessarily on transformers. The position is one that carries excellent prospects. Commencing salary, according to qualifications and experience, in the range of £1,000 to £1,500. Pension scheme.—Application forms from Mr. R. J. Hebbert, Staff Manager, Ferranti Ltd., Hollinwood, Lancs. Please quote reference T.D. (N 123)

GREENGATE AND IRWELL RUBBER CO., LTD., have a vacancy with good prospects in their cable sales office for a competent ASSISTANT with estimating experience.—Apply in confidence to Personnel Dept., Greengate Works, Manchester 3. (N 129)

JOHNSON AND PHILLIPS LTD., have vacancies in their transformer department for an experienced TRANSFORMER DESIGNER capable of dealing with all sizes up to 10 MVA; EXPERIENCED DRAUGHTSMEN capable of handling all medium sizes up to 2,000 kVA alternatively 5,000 kVA.—Applications, giving age, experience, training and salary expected, should be addressed to Employment and Welfare Manager, Johnson and Phillips, Limited, Victoria Works, Charlton, London, S.E.7. (N 9)

JOHNSON AND PHILLIPS LTD. require JUNIOR TRANSFORMER ESTIMATOR and TECHNICAL CORRESPONDENT, aged 22 to 25. Experience of transformer manufacture essential supplemented by technical training.—Applications, in writing, giving particulars of age, training, experience and salary required, to Employment and Welfare Manager, Johnson and Phillips Ltd., Victoria Works, Charlton, London S.E.7. (N 115)

JOHNSON AND PHILLIPS LTD.—Switchgear Works in Johannesburg, South Africa. SENIOR SWITCHGEAR DESIGN and DEVELOPMENT DRAUGHTSMAN required for power station and control gear ranging from medium to high voltage (11 kV). Only experienced men, not above 35 years of age, need apply.—Reply, stating age, salary and experience, to Employment and Welfare Manager, Johnson and Phillips Ltd., Charlton, London S.E.7. (N 116)

JUNIOR DRAUGHTSMAN required, aged 21 to 25 years, preferably some experience overhead line switchgear. —Line Equipment Ltd., Bridgend. (N 11)

JUNIOR ENGINEERS and LABORATORY ASSISTANTS required for the development of instruments, meters and relays. University degree or Higher National Certificate standard required.—Apply, in writing, stating age, experience and salary required, marking envelopes "Meter," to Personnel Manager, Metropolitan-Vickers Electrical Co. Ltd., Trafford Park, Manchester 17. (N 83)

LAMINATED Insulation Manufacturer requires TECHNICIAN for responsible position involving Process supervision and development work on manufacture of Bakelised Paper Bushing insulators. Previous experience in insulation manufacture desirable.—Apply, Permali, Ltd., Bristol Road, Gloucester, stating age, qualifications and salary required. (N 93)

PROCESS ENGINEER with thorough experience of manufacture of motors and generators for Diesel electric locomotives required to take charge of process planning of this equipment. Salary up to £600 per annum will be paid to suitable applicant.—Please apply in confidence, giving full details of training, qualifications, experience and present salary to Box No. 1115. (N 73)

SENIOR TECHNICAL ASSISTANT to the Sales Manager is required by Manchester manufacturers whose products are widely employed in the electrical and mechanical industry both home and overseas. Applications are invited from engineers, age about 35, having broad commercial experience in a sales organisation or its equivalent and recognised technical qualifications and practical training. The person appointed will assist in the general supervision and direction of the inside and outside sales staff, liaison with works and research departments, development and marketing of new products and contact with senior executives of purchasers and overseas agents. Substantial initial salary fully commensurate with qualifications and experience, favourable pension scheme and excellent prospects for a man possessing all-round ability, tact and initiative.—Applicants should give full details of education, technical and practical training, commercial experience and order of salary required to Box No. 1135, Electrical Times. (N 128)

WANTED, ELECTRIC CABLE TESTER required for factory at Leigh. Applicants need not have had previous experience but preference will be given to those wishing to train as electrical engineers. Five-day week. —Please apply by letter to Staff Officer, B.I.C.C. Ltd., Leigh, Lancashire, stating age, wage required and qualifications. (N 108)

TRANSFORMER TEST ENGINEERS aged 21-29 years, and preferably with Ordinary National Certificate qualifications, required for work on test bed of a large Midlands manufacturing group. Applicants should have had experience on power and distribution transformers, and some experience with instrument transformers would be an asset. Excellent opportunities for advancement under good working conditions for the right type of men.—Please reply, giving details of experience, age, salary required, etc., to Box No. 1119, Electrical Times. (N 82)

APPOINTMENTS FILLED

UGANDA ELECTRICITY BOARD

THE Chairman of the Uganda Electricity Board wishes to thank all those who applied for the post of STOREKEEPER CLERK. Over 400 applications were received, and a number of these have been selected for interviews and will be informed of the time and place in due course. It is not possible to notify each unsuccessful candidate individually, and it is hoped applicants' attention will be called to this notice. (N 106)

APPOINTMENTS WANTED

ELECTRICIAN-WIREMAN (38), 19 years' experience of all installation systems, repairs, etc., requires situation in Guernsey, C.I., or Southern England. Free now.—Box No. 1095, Electrical Times. (N 14)

OPERATOR, British, 37, 10 years' experience steam power plant overseas, seeks change, either home or abroad.—Write, BM/TBGK, London, W.C.1. (N 117)

TECHNICAL SALES REPRESENTATIVE, requiring change, seeks progressive situation. At present with C.M.A./E.L.M.A. manufacturer.—Box No. 1117, Electrical Times. (N 81)

WORK WANTED

A.C. and d.c. Motor Rewinds and Repairs. Prompt service, fully guaranteed. Edgware 8631 (4 lines). —Service Electric Co., Ltd., Stanmore, Middx. (D 324)

CASTINGS. Fisher Foundries, Ltd., Greet, Birmingham, have capacity for brass, gun metal and soft grey iron machine moulded repetition castings weighing 1-30 lb. Loose pattern work up to 3 cwt. Delivery by road to all parts. Tel.: B'ham. Victoria 0197. (L 318)

METALWORK. All types cabinets, chassis, racks, etc., to your own specifications.—Philpott's Metalworks Ltd., Chapman Street, Loughborough. (L 601)

WANTED

A.C./D.C. MOTORS, STARTERS, complete change-over installation, etc.—A.A. Electrical Co., Ltd., 67 Rothschild Road, Chiswick Park, W.4. Tel.: Chiswick 5105. (A 20)

BEST prices and a square deal offered in cash for ALUMINIUM, BRASS AND COPPER in sheets or rods. Works clearances and scrap a speciality.—Dvas and Fowle, 41 Loudoun Road, London N.W.8. Maida Vale 5477, 8641 and 5489. (N 61)

ELECTRICAL STEEL OFFCUTS required. Small and large quantities from between ·016 in. to ·025 in. in 2 ft lengths or upwards but not less than 3 in. in width. Prompt payments.—Box No. 1063, Electrical Times. (M 167)

MERCURY ARC RECTIFIER, input 400 V 3-phase 50 cycles, output 200 V d.c. Any rating 30/50 kW.—Oldfield Engineering Co. Ltd., 96 East Ordsall Lane, Salford 5. (N 161)

MOTOR generator WELDING SET, 440 V, 3 phase, 50 cycles. Generator to have an output of 230 V d.c. 50 kW. Alternatively rectifier input 230 V d.c. 50 kW.—F. J. Edwards Ltd., 359 Euston Road, London, N.W.1. (N 124)

WANTED, all types of AMERICAN manufactured ELECTRICAL EQUIPMENT OF ANY DESCRIPTION. Large or small items, full details to: Wilfio Products, 216/222, Gorbals Street, Glasgow C.5. (N 139)

WANTED, ROTARY CONVERTORS, any size.—Universal, 221 City Road, London, E.C.1. (A 16)

WANTED for prompt cash, ferrous and non-ferrous SCRAP; also plant for dismantling. Buyers of second-hand machinery and plant for re-use.—W. and H. Cooper, Ltd., 176 Brady Street, Bethnal Green, E.1. (A 1)

WANTED. Large quantity of 4-in. outside diameter TUBES from the dismantling of old Babcock Water-tube Boilers. Best prices paid. Prepared to purchase Babcock and Wilcox Water-tube Boilers for dismantling. —Apply, giving full details to Midland Iron and Hardware Co., Cradley Heath. (A 5)

WANTED, D.C. and A.C. ball-bearing MOTORS, MOTOR GENERATOR SETS, DYNAMOS and ALTERNATORS.—Full details to Britannia Manufacturing Co., Ltd., 22-26 Britannia Walk, London N.1. (A 13)

750 500 and 250 kVA OIL IMMERSED TRANSFORMERS. Transformers are required for re-winding. Therefore condition of existing windings immaterial.—Box No. 1139, Electrical Times. (N 162)

AGENCIES

AGENCY sought for electric cables, for power, lighting, mining application, etc., for party with good connections in Scottish field amongst most type of electric consumers.—Write 1001, Wm. Porteous and Co., Glasgow. (N 144)

FOR SALE

CABLES & WIRE

AVAILABLE for immediate delivery. Quantities of bare and covered COPPER, NICKEL CHROME and EUREKA WIRES.—Send for priced schedule: The Mulberry Company, 223 St. John Street, London E.C.1. Tel.: CLErkenwell 8356-7-8. (N 71)

EARTH-CONTINUITY: Use Portaway Earthing Conductor with the Fulgrip-Portaway bonding clamp for most efficient earthing system.—Details from Porter Electrical Products Ltd., Bramhope, Leeds. Tel. 73423. (N 40)

ENAMEL COVERED COPPER WIRE, new bulk supplies for early delivery, 35 to 14 s.w.g.; prices 13/6 to 9/- lb. —Box 1127, Electrical Times. (N 57)

550 KILOS DOUBLE SILK COVERED COPPER WIRE 0.27 mm thick. Delivery immediately from stock. Make: The Temple Electrical Co. Ltd.—Apply to Hjalmar Andren and Soner, Kaptensgatan 6, Stockholm, Sweden. (N 140)

DOMESTIC APPLIANCES

IMMERSION HEATERS, Grubb 4 kW. No purchase tax. All lengths, 16 in. to 36 in. Standard voltages. Provision for intermediate loadings. Fully guaranteed. Write for illustrated brochure, latest lists and traders terms to distributors.—John Owner and Co. Ltd., Springfield Road, Birmingham 13. Tel.: Spr. 2939. (C 392)

"MORAHEAT" 4 kW IMMERSION HEATERS with Satchwell thermostatic control, 16 in. to 42 in. Fully guaranteed, reliable, competitive, good deliveries. —Apply: Agent, W. Tyler, 20 Finnemore Road, Little Bromwich, Birmingham. (M 166)

ENGINEERING PLANT & MATERIALS

ALUMINIUM and ALLOY SHEETS in various sizes available in most gauges. Copper, brass and aluminium in strip, rods and tubes.—Send for list or call Dyas and Fowle, 41 Loudoun Road, London N.W.8. Maida Vale 5477, 8641 and 5489. (N 62)

FOR immediate delivery, TUFNOL ROD, $\frac{1}{8}$ in. diameter, 4,500 ft.; $\frac{1}{2}$ in. diameter, 4,250 ft. Large quantity ERINOID ROD, $\frac{5}{8}$ in. diameter, colours white, green and red. All brand new material.—Write, Douglas Price, Cottage, Claybrooke Grange, Rugby, or ring Leire 287. (N 163)

HIGH CYCLE DRILLS, No. 14 D.H., $\frac{1}{4}$-h.p., 220 V; 160 for sale.—Foundation Oil Co., Ltd., 8 Orford Hill, Norwich. (N 25)

MASSEELEY STAMPING MACHINES, rebuilt and guaranteed by Hill Bros., Ltd., Acton Works, Beaconsfield Road, London, W.4. Also types, dies, foil, transfer film, acetates, cardboard, gummed papers, guillotines, etc., all at bargain prices. Tel.: Chiswick 2235. (N 169)

STEEL sheets or off-cuts, any shape, size and gauge, or stock rusty, any quantity or distance.—W. Marriott, 10 Hockley Hill, Birmingham. (N 56)

GENERATING PLANT

PORTABLE Diesel 15 kVA ALTERNATING SET on Trailer 400/230 volts, 3-phase, 50 cycles, 1,500 r.p.m., complete.—Box 1137, Electrical Times. (N 146)

THREE ONAN PETROL ELECTRIC GENERATING SETS: 230 V, 3 kVA, 60 c.s, 1-ph.; complete with starter batteries.—B. T. Jobborn & Co., 38, St. Johns Road, Seven Kings, Essex. (N 172)

TWO 65 kW MOTOR GENERATING SETS mounted on steel bedplate comprising: Brooks 110 h.p., 960 r.p.m., slip ring, 400/3/50 B.B. a.c. Motor Direct coupled to Generator 65 kW., Volts 0/650 d.c. with Exciter 1·5 kW, 210 V, complete with liquid Starters and Panel.—Apply: C. J. Rice, 137 Mayplace Road West, Bexleyheath, Kent. Tel.: Bexleyheath 3282. (L 539)

9 kVA MEADOWS PETROL ALTERNATOR SET, 230/1/50 complete with automatic voltage regulator, voltmeter and manual voltage control. Immediately available demonstration and delivery.—Radio Heaters Ltd., Wokingham 1030, Berks. (N 164)

18 $\frac{1}{2}$-KW. 220 d.c. DIESEL GENERATING SET, Gardner/English Electric; 4 cylinders, 1,000 r.p.m.; built 1943; practically unused.—Fielding, 1 Easterly Crescent, Leeds, 8. (N 26)

20 kWA LISTER DIESEL Metropolitan-Vick, complete with transformer and switchboard. Hardly used.—Box No. 1113, Electrical Times. (N 72)

LIGHTING EQUIPMENT

BULBS, BULBS, BULBS, from 1·5 V to 250 V. Filament, Neon, Discharge. Specials, BRITISH AND AMERICAN. Prompt delivery.—Suplex Lamps, Ltd., 239 High Holborn, London W.C.1. (M 109)

PURLEY CHOKES AND BALLASTS. Our 80w Tapped h.p.f. Ballast, with Starter Switch-holder incorporated, is proving itself the most popular unit. Suitable for most fittings, 57/6 each, subject.—F. W. Blanshard Ltd. (Dept. ET), Purley, Surrey. Uplands 4818/9. (E 343)

METERS

A.C./D.C. QUARTERLY and SLOTMETERS.—Brent Electrical Co., 6 Holmdale Gdns., N.W.4. (A 15)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Road, London E.C.1. (C 51)

METERS, A.C. and D.C., new and reconditioned, all types. Quarterly, single and three-phase, 3 and 4 wire, 2½ to 1,000 amps. Prepayment, single and double tariff, single, dual and triple coin, fixed and variable tariff, 2½ to 50 amps. M.D.I., Billiards Switches, Rent Collectors. Prices from 5/- carriage paid, guaranteed for ever, immediate delivery.—Illustrated catalogue from The Electric Meter Company, Castor Road, Brixham. (L 646)

MOTORS & STARTERS

A. A. ELECTRICAL CO. FOR A.C./D.C. MOTORS, SWITCHGEAR, EXHAUST FANS, HOISTS, REDUCTION GEARS, new or reconditioned units.—Chiswick 5105, Fairlands 8279, 67 Rothschild Road, W.4. (A 19)

A.C. and D.C. MOTORS, GENERATORS from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 8631/4. (A 476)

A.C. and D.C. MOTORS, GENERATORS, SWITCHGEAR, etc., always in stock. Let me have your inquiries.—G. E. Whittaker, Wellington Mill, Bolton Road, Blackburn. Tel. 7232. (A 12)

A.C. and D.C. MOTORS, all sizes, large stocks fully guaranteed.—Milo Engineering Works, Ltd., Milo Road, East Dulwich, S.E.22. (Forest Hill 2278-9). (A 10)

(Continued on page 68)

ELECTRIC MOTORS, GENERATORS, TRANSFORMERS A.C. & D.C.

STARTERS, SLIP RING & D.C., SEMI-AUTOMATIC

Any voltage, new, short delivery, all types of revolving electrical power.

ELECTROPOWER COMPANY LIMITED

Kingsbury Works, Kingsbury Road, London N.W.9. Telephone: COLindale 4621/2. (D 17p)

(Continued from page 67)

FOR ELECTRICAL MOTORS, GENERATORS, ALTERNATORS, SWITCHGEAR, please send your inquiries to Oldfield Engineering Co., Ltd., 96 East Ordsall Lane, Salford 5. (C 296)

ONE variable speed B.T.H. 400 V, 3-ph., 50 c/s COMMUTATOR MOTOR.—Box No. 1145, Electrical Times. (N 168)

1/3 H.P. B.T.H. MOTORS and SWITCHES. 1,425 r.p.m. for 400/440 V, 3 phase, 50 cycles. 65 available.—F. J. Edwards, Ltd., 359 Euston Road, London N.W.1. Euston 4681. (N 130)

SWITCHGEAR

MERCURY SWITCHES are made by Hall Drysdale and Co., Ltd., of 58 Commerce Road, Wood Green, London N.22. Tel.: Bow 7221. (C 175)

UNCLASSIFIED

SWITCHGEAR. Two 300 amp. h.t. draw-out type Switch Cubicles by Ferguson Pailin; 11 kV, rupturing capacity 50 MVA, complete with all instruments, etc. BATTERIES. 150 amp. hour Alkium "Alkaline Battery by Britannia Batteries, type K.15H, having 24 units each of 8 cells, carried on timber battery stand, complete with 2 Westinghouse Metal rectifiers and Westinghouse charging and control board.—B.C.S. (Engineers and Contractors) Ltd., 3 Castle Street, Cardiff. Tel.: Cardiff 8512-3-4. (N 27)

BUSINESSES FOR SALE

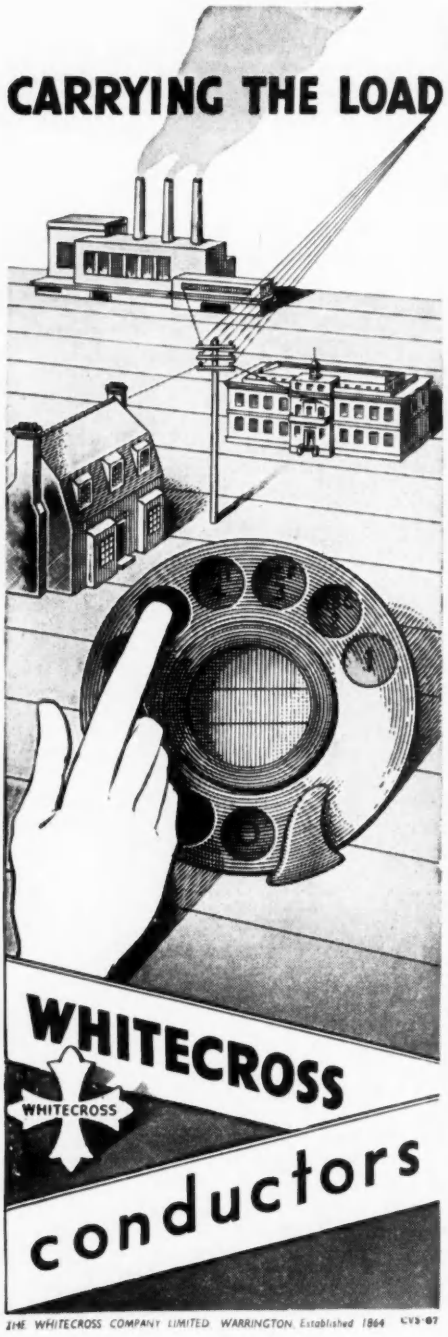
SMALL ELECTRICAL CONTRACTING and RETAIL BUSINESS. Country town, main road. Comprising house and shop. £1,500. S.A.V.—Box No. 1151, Electrical Times. (N 174)

MISCELLANEOUS

CITY AND GUILDS (Electrical, etc.) on "No pass—No Fee" terms. Over 95% successes. For full details of modern courses in all branches of Electrical Technology send for our 144-page handbook, FREE and post free. B.I.E.T. (Dept. 39), 17 Stratford Place, London W.1. (D 244)

IT is desired to secure the full commercial development in the United Kingdom of British Patents Nos. 608,245 and 604,933 which relate to "TOTALISING DEVICES" and "ELECTRICAL CONTROL AND INDICATING DEVICES" either by way of the grant of licences or otherwise on terms acceptable to the Patentee. Interested parties desiring copies of the patent specifications and further particulars, should apply to Stevens, Langner, Parry and Rollinson, 5 to 9 Quality Court, Chancery Lane, London W.C.2. (N 131)

RICHARDS AND PARTNERS, associated with George Offord and Co., Auctioneers and Valuers of PLANT AND MACHINERY AND INDUSTRIAL PROPERTY, Granville House, Arundel Street, London W.C.2. Tel.: TEMple Bar 7471. (A 23)



FIRE!
WHERE'S YOUR
NU-SWIFT?
The World's Fastest Fire Extinguishers — for every Fire Risk
Pressure-operated by sealed CO_2 Charges
NU-SWIFT LTD. • ELLAND • YORKS
In Every Ship of the Royal Navy

Durban

0.25 sq. in. 3-core 33 kV Cable being laid between Connaught Sub Station and Parkhill Sub Station by Durban Municipal Electricity Department.

SCOTTISH CABLES LIMITED

DEANSIDE • RENFREW • SCOTLAND

LONDON OFFICE • BUSH HOUSE • ALDWYCH, W.C.2

Associated Company: SCOTTISH CABLES (SOUTH AFRICA) LTD. PIETERMARITZBURG, NATAL

INDEX TO ADVERTISERS

Aerialite Ltd. 89
A.E.W. Ltd. 74

Beetle Products Ltd. 37
Belling & Co., Ltd. 6
Benjamin Electric Ltd. 51
Bill Switchgear Ltd. 5
Birch, H. A., & Co., Ltd. ... 13
Britannia Batteries Ltd. ... 15
Britannia Engineering Co. ... 49
Britannic Electric Cable and Construction Co., Ltd. 72
British Electric Meters Ltd. ... 71
British Insulated Callender's Cables Ltd. 1, 41
British Power Transformer Co., Ltd. 38
British Thomson-Houston Co., Ltd. 87
Brownings Electric Co., Ltd. ... 20

Carter, B. & F., & Co., Ltd. ... 82
Chilton Electric Products Ltd. ... 32
Chloride Batteries Ltd. 8
City Engineering Co. (Boreham Wood) Ltd. 12
Clang Ltd. 84
Clyde Blowers Ltd. 72
Cole, E. K., Ltd. 26
Courtney Pope (Electrical) Ltd. 82
Cressall Manufacturing Co., Ltd. 4
Critchley Bros. Ltd. 78

Deco Engineering Co., Ltd. ... 80
Dewrance & Co., Ltd. 47
Dexion Ltd. 84
Dorman & Smith Ltd. 90

Electric Construction Co., Ltd. 88
Electropower Gears Ltd. ... 36
Elliott Brothers (London) Ltd. 9
Engineering & Lighting Equipment Co., Ltd. 17
English Electric Co., Ltd. 33, 75
Erskine, Heap & Co., Ltd. ... 39

Everett Edgcumbe Ltd. ... 83
Evershed & Vignoles Ltd. ... 11

Ferranti Ltd. 52
Ford, A. C., Ltd. 76
Fry's Metal Foundries Ltd. ... 56

Geipel, William, Ltd. 84
General Electric Co., Ltd. 30, 48, 73
Gilflex Conduits Ltd. 26
Grubb Engineering Co., Ltd. ... 80

Hackbridge & Hewittic Electric Co., Ltd. 54
Hague & MacKenzie Ltd. ... 36
Heaths (Eccles) Ltd. 80
Henley's W. T., Telegraph Works Ltd. 59
Holophane Ltd. 29
Hoover Ltd. 58
Hotpoint Electric Appliance Co., Ltd. 18

International Combustion Ltd. 55
Ismay, John, Ltd. 4

Jackson Electric Stove Co., Ltd. 31
Johnson & Phillips Ltd. 2

Kempston Electrical Co., Ltd. ... 82
Key Engineering Co., Ltd. ... 82

Laing, John, & Son Ltd. ... 44
Lancashire Dynamo & Crypto (Mfg.) Ltd. 77
Laurence Scott & Electromotors Ltd. 3
Legg (Industries) Ltd. 16
Lewis Spring Co., Ltd. 20
Lindley Thompson Transformer & Service Co., Ltd. 40

Manganese, Bronze & Brass Co., Ltd. 28
Measurement Ltd. 42
Measuring Instrument (Pullin) Ltd. 84
Mersey Cable Works Ltd. ... 19
Metropolitan-Vickers Electrical Co., Ltd. 7, 12, 60
Metway Electrical Industries Ltd. 86
Midland Electric Manufacturing Co., Ltd. 23
M.K. Electric Ltd. 79
Moss, William, & Sons Ltd. ... 38

National Fire Protection Co., Ltd. 86
Nevelin Electric Co., Ltd. ... 90
Nu-Swift Ltd. 68

Parmiter, Hope & Sugden Ltd. 46
Partridge, Wilson & Co., Ltd. ... 86
Permaheat Ltd. 32
Popes Electric Lamp Co., Ltd. ... 25
Premier Cooler & Engineering Co., Ltd. 12

Renfrew Foundries Ltd. ... 43
Revo Electric Co., Ltd. 22
Reyrolle, A., & Co., Ltd. ... 85
Ronning & Co. 4
Rotunda Ltd. 78

Sanders, William, & Co. (Wednesbury), Ltd. 10
Scemco Ltd. 70
Scottish Cables Ltd. 69
Service Electric Co., Ltd. ... 36
Shell Mex & B.P. Ltd. 24
Simmonds & Stokes Ltd. ... 76
Simplex Electric Co., Ltd. ... 50
S.N. Engineering Co., Ltd. ... 86
Sperryn & Co. 16
Standard Telephones & Cables Ltd. 81
Statter, J. G., & Co., Ltd. ... 45
Steatite & Porcelain Products Ltd. 21
Sunvic Controls Ltd. 34
Sutcliffe, Speakman & Co., Ltd. 74

Taylor Tunnicliff & Co., Ltd. ... 35
Thorn Electrical Industries Ltd. 14
Tucker, J. H., & Co., Ltd. ... 27

U.S. Metallic Packing Co., Ltd. 34

Whitecross Co., Ltd. 68
Whiteley, B. S. & W., Ltd. ... 53

Zenith Electric Co., Ltd. ... 34

SALES EXCEED 75,000

INDUSTRIAL BATTEN TYPE FLUORESCENT FITTINGS

4′ 40w.—£3-12-0 "DL" (Less Lamp)
5′ 80w.—£4-12-6 "DL" (Less Lamp)
List Prices - Subject to Trade Discounts

All components covered by SCEMCO Guarantee

SCEMCO LTD.

Soho Street, London, W.1. GER. 1461-3
★ *Send for 20 Page illustrated Catalogue*

Available with pointer or cyclometer type dial

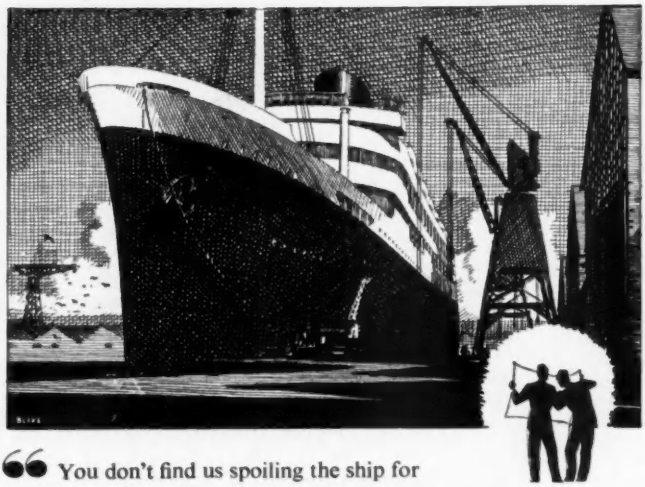
TYPE TM2

BRITISH ELECTRIC METERS LTD.

BRYNLLWYD WORKS, CAERNARVON RD., BANGOR, N. WALES

TELEPHONE: BANGOR 860 TELEGRAMS: BRITMETER, BANGOR

ONE OF THE DENIS FERRANTI GROUP



Britannic Cables carry the load

"You don't find us spoiling the ship for a ha'porth of tar—there's no object in wasting good money—that's why we made sure that for all the services and auxiliaries of this great ship . . . Britannic Cables carry the load."

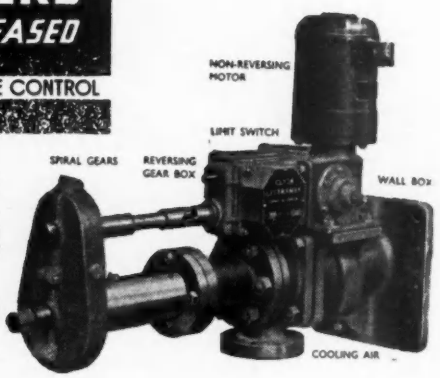
Britannic Cables are made to B.S.I. specification or better. The range, constantly extending—includes power cables, industrial and mining cables and domestic types of every sort. Britannic is independent—prices are truly competitive. Enquire through your usual suppliers or write to us direct.

BRITANNIC ELECTRIC CABLE & CONSTRUCTION CO. LTD · IVER · BUCKS · ENGLAND

Clyde SOOT BLOWERS

BOILER AVAILABILITY INCREASED

ELECTRO-MECHANICAL OPERATION with SEQUENCE CONTROL



Improvements Over Manual Operations

1. No physical exertion required.
2. Soot blowing carried out in a quarter of the time.
3. Shorter period of abnormal combustion conditions.
4. Cleaner heating surfaces with higher and sustained rate of evaporation.
5. Saving in fuel and labour costs.
6. Increased boiler availability.

London—
34 VICTORIA ST., S.W.1
Telephone: ABBEY 1847

Manchester—
1, CHANCERY LANE, SPRING GARDENS
Telephone: DEAnsgate 4262

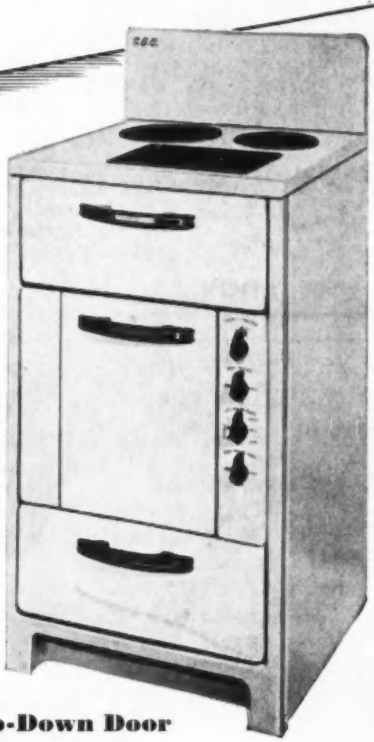
★

Clyde BLOWERS Ltd

LIVINGSTONE STREET, CLYDEBANK
'Phone: CLYDEBANK 1576/77 'Grams: 'MURWILS GLASGOW'

"Made by the G.E.C."

. . . an assurance of satisfaction



Features of the DC 114

★ In Two-Tone Ivory or Cream and Green

★ Finished in Acid-Resisting Vitreous Enamel

★ Extra large Oven Thermostatically Controlled

★ Sheathed-Wire Oven Elements

★ Counter Balanced Drop-Down Door

★ Cast Iron Front Frame and Hob

G.E.C. ELECTRIC COOKERS

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

F

Interior of standard oven showing forced-draft circulation.

MODERN AEW ELECTRIC

INDUSTRIAL OVENS

for

DRYING, PRE-HEATING, VARNISH BAKING, AND PAINT STOVING OF ALL TYPES OF MATERIALS USED IN ELECTRICAL AND MECHANICAL ENGINEERING LABORATORIES CHEMICAL, AIRCRAFT, RADIO, GLASS AND MOTOR CAR MANUFACTURE

A.E.W. Industrial Ovens are suitable for all classes of production in any industrial processes requiring temperatures up to 350° C. (600° F.). Available in a variety of standard types and sizes, but all types and sizes can be supplied to customers' individual requirements.

A.E.W. LTD., EDGWARE, Middx. **Tel.: EDGWARE 0323 & 3975**

Hot brass & copper pressings

of every description for the electrical industry

We can supply pressings only or pressings machined to customers' requirements

SUTCLIFFE SPEAKMAN

AND COMPANY LIMITED, LEIGH, LANCASHIRE

London Office: 2, Caxton St., Westminster, S.W.1. Phone: Abbey 3085

'ENGLISH ELECTRIC'

fusegear

Higher Short-circuit "Making" Capacity— 50 MVA

Previously tested at 25 MVA, 'ENGLISH ELECTRIC' combination fuse switches of the new standard shrouded pattern have now successfully passed 3-phase 440 volt short-circuit "making" tests at 35 MVA and 50 MVA.

The ratings tested were 30, 60, 150, 300, 500 and 750 amps.

Three successive "make" tests were made, after which the 30, 60 and 150 amp. combination fuse switch units were fit for commercial use without reconditioning. Only slight rectification of contacts on the larger sizes was necessary.

All 'ENGLISH ELECTRIC' combination fuse switches incorporate 'ENGLISH ELECTRIC' high rupturing capacity non-deteriorating type 'T' cartridge fuse links which are A.S.T.A. certified to B.S.88-1947 for Category of Duty 440AC5.

The ENGLISH ELECTRIC Company Limited

QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Fusegear Works: East Lancashire Road, Liverpool 10

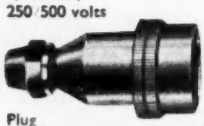
Works: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL

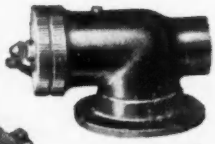
F.5

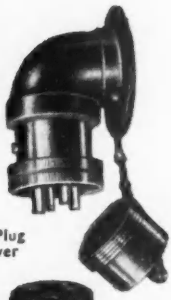
REGD. TRADE MARK
NIPHAN

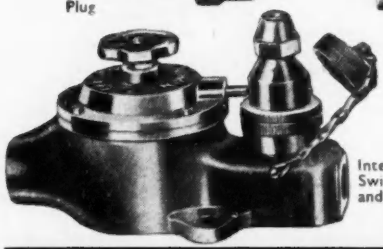
WEATHERPROOF METAL-CLAD PLUGS, SOCKETS, SWITCH PLUGS, ETC.
for all electrical purposes

5/300 amp.
250/500 volts


Plug


Through Angle Socket and Cover


Flange Angle Plug and Cover


Interlocked Switch Socket with Cover and 3- or 4-pole Plug

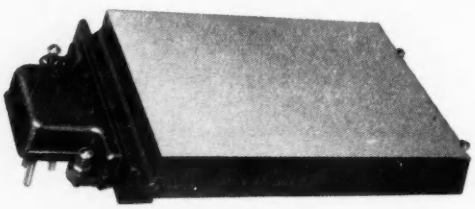
Plain Socket

Latest Catalogue on Application

SIMMONDS & STOKES LIMITED
MANUFACTURING ELECTRICAL ENGINEERS
Victoria House, Southampton Row, London, W.C.1 · Holborn 8637 and 2163

OVERSEAS AGENTS: *S. AFRICA, Hubert Davies & Co., Ltd., Johannesburg. NEW ZEALAND, Samuel Brown, Ltd., Wellington. INDIA, G.E.C. (India) Ltd., Calcutta. CEYLON, Walker & Greig, Ltd., Colombo.*

FORD'S GRILL BOILERS

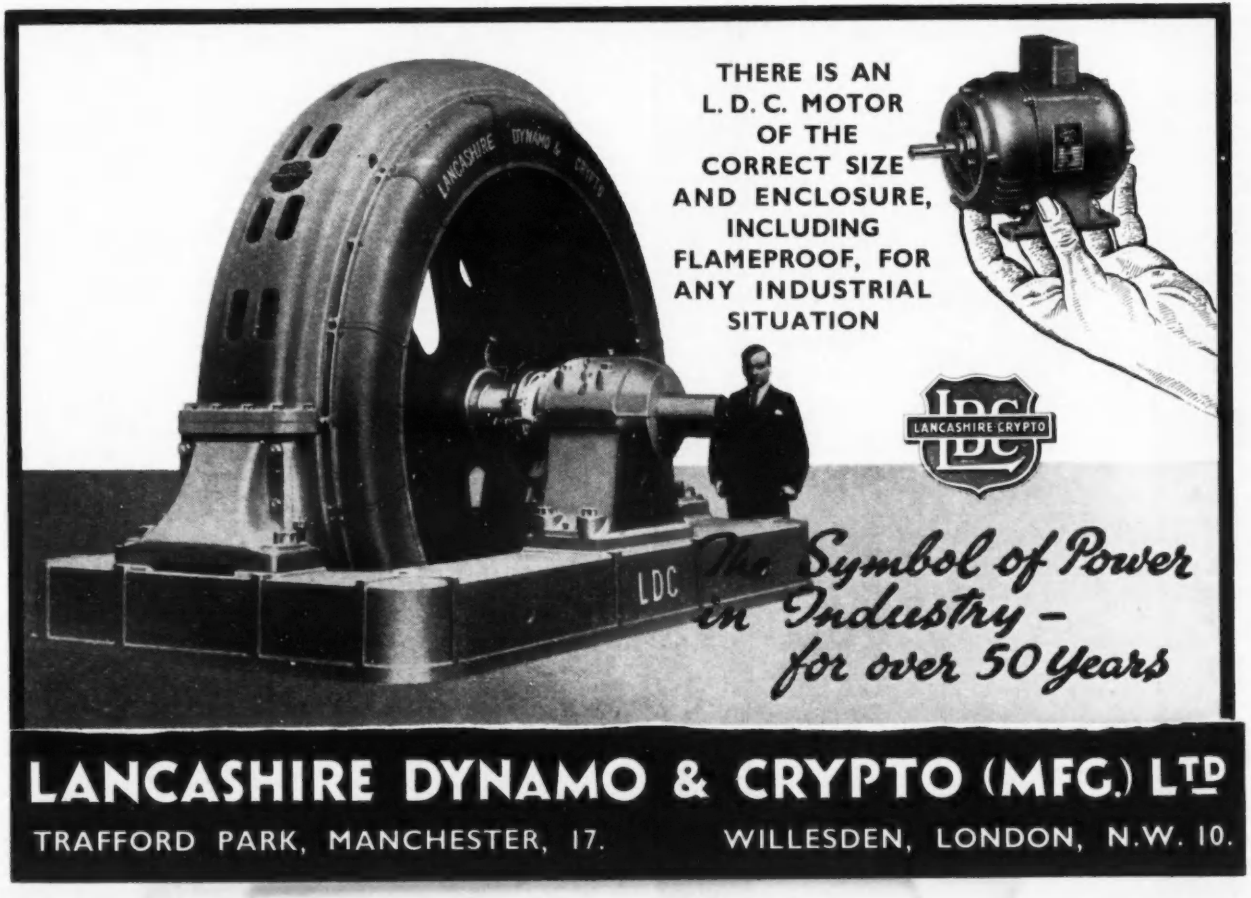


SUPPLIED FOR FOLLOWING MAKES OF COOKERS

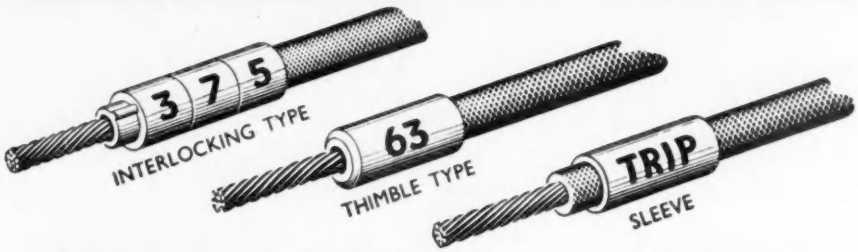
CREDA • EECo. • EDA • GEC • REVO • JACKSON

Ford's Grill Boilers while cheap, are the Hallmark of efficiency and reliability and will give a good saving on your service cost.

A. C. FORD Ltd., Lawley St., DUDLEY


THERE IS AN
L. D. C. MOTOR
OF THE
CORRECT SIZE
AND ENCLOSURE,
INCLUDING
FLAMEPROOF, FOR
ANY INDUSTRIAL
SITUATION
LANCASHIRE CRYPTO
LDC
The Symbol of Power
in Industry –
for over 50 Years
LANCASHIRE DYNAMO & CRYPTO (MFG.) LTD
TRAFFORD PARK, MANCHESTER, 17.
WILLESDEN, LONDON, N.W. 10.

CABLE MARKERS

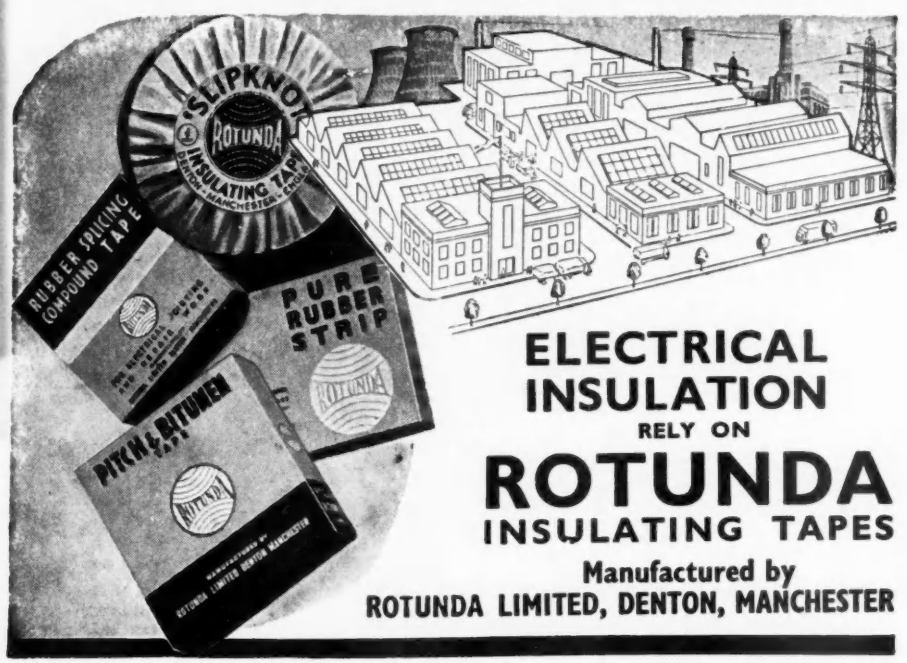


INTERLOCKING TYPE—engraved figures 0-9 and letters A-Z.
THIMBLE TYPE—plain or engraved to Customers' requirements.
SLEEVES—plain or engraved to Customers' requirements.

WRITE FOR FULL DETAILS

CRITCHLEY BROS LTD - BRIMSCOMBE - STROUD

Telephone Brimscombe 2208



ELECTRICAL INSULATION
RELY ON
ROTUNDA
INSULATING TAPES
Manufactured by
ROTUNDA LIMITED, DENTON, MANCHESTER

Originality

The safety of children in the home has been featured by us in advertisements since first we introduced fully interlocking switchsockets some thirty years ago. This picture is reproduced from an old catalogue. Boys will always have their share of mischief and curiosity; but ingenious electrical accessories, such as those pioneered by MK, have kept each successive generation out of harm's way. In the early thirties we introduced a switchsocket to interlock with ordinary British Standard unmutilated plugs. This design, substantially unaltered, is still in great demand — a sure tribute to originality and reliability.

M.K. ELECTRIC LIMITED

WAKEFIELD STREET, EDMONTON, LONDON, N.18

Phone: Tottenham 5151 *Grams:* Multiconta, Southtot, London

A46

Insist on **"GRUBB"**

All Electric

IMMERSION HEATERS

OR

CIRCULATORS

Thermostatically controlled HOT WATER available at all times

Guaranteed for TWO YEARS

LOADINGS available in 2, 3 and 4 kW

IMMERSION HEATERS from 12" to 42"

CIRCULATORS for soft water areas only Sizes : 16" to 42"

Write today for price lists, brochures and Trade terms to the sole manufacturers :

GRUBB ENGINEERING COMPANY LIMITED BIRMINGHAM 12

EXPORT ENQUIRIES INVITED

DECO CABLE REELING DRUMS

for all moving structures

DECO Electrical Products include

Contact Collector Columns, Limit Switches, Overhead Collector Equipment, Winch Limiting Mechanisms for Skip Hoists, Cranes and Mechanical Handling Plants, Cable Reeling Drums

DECO ENGINEERING CO. LTD.

West Row, N. Kensington, London, W.10 Ladbroke 3066-7

P370

Steel

WHEELBARROW

All barrows can be supplied with Pneumatic, Solid Rubber or Steel wheels.

Specially constructed. No bolt holes at vulnerable points. Heavily banded body and other unique characteristics ensure the most durable barrow on the market.

Can be supplied in all sizes.

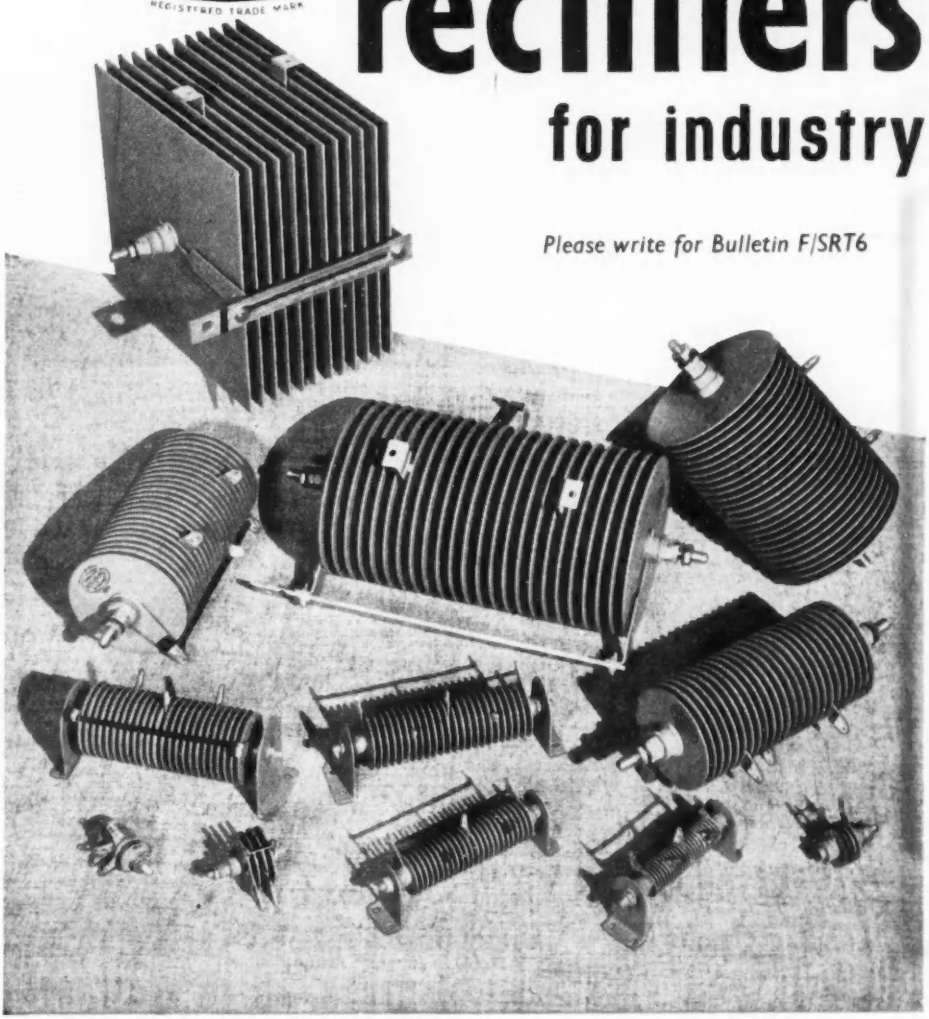
Stocked by your local merchant

MADE BY HEATHS LIMITED CAWDOR STREET PATRICROFT · ENGLAND

SELENIUM
SenTerCel
RECTIFIERS
REGISTERED TRADE MARK

rectifiers
for industry

Please write for Bulletin F/SRT6



Standard Telephones and Cables Limited **RECTIFIER DIVISION**
Registered Office: Connaught House, Aldwych, London, W.C.2
WARWICK ROAD, BOREHAM WOOD, HERTFORDSHIRE
Telephone: Elstree 2401 *Telegrams: Sentercel, Borehamwood*

Amhurst 'PERSPEX' TROUGH

A HIGH GRADE FITTING FOR GENERAL SERVICE

giving extensive service at low cost

THIS WORTHY ADDITION

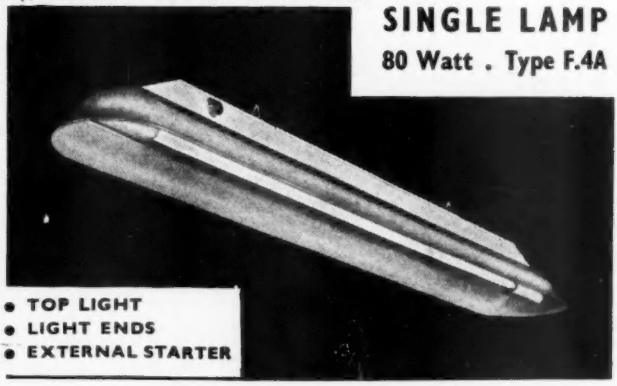
to a long line of well designed fittings is now available.

PRICE COMPLETE

with control gear and starter switch

£10.19.6

(FLUORESCENT TUBE EXTRA)



SINGLE LAMP

80 Watt . Type F.4A

- TOP LIGHT
- LIGHT ENDS
- EXTERNAL STARTER

Technical Bulletin sent on request.

COURTNEY, POPE (ELECTRICAL) LTD., AMHURST PARK WORKS, LONDON, N.15

KEY

FIBRE CONDUIT

FOR UNDERGROUND CABLES

EXTREMELY EASY TO LAY, NO PROJECTION AT JOINTS, LONG LENGTHS, FEW JOINTS, PERFECT ALIGNMENT.

Write for details and specifications.

EXPORT

Write for names of Overseas Agents.

THE KEY ENGINEERING CO., LTD.

4, Queen Victoria Street, London, E.C.4. Telephone: CITY 1185/6

and

Trafford Park, Manchester. Tel.: TRAFFORD PARK 1903

RATCHET & REVOLUTION COUNTERS

PLEASE SEND FOR LEAFLET No. 18/7

Speeds up to 6,000 r.p.m.

SOLE MAKERS AND PATENTEES:—

B. & F. CARTER & CO. LTD. BOLTON, 9

Members of B.E.S.T.E.C. Organisation

Obtain your **SPARE PARTS** *for* **AMERICAN CONTROL GEAR** *from*

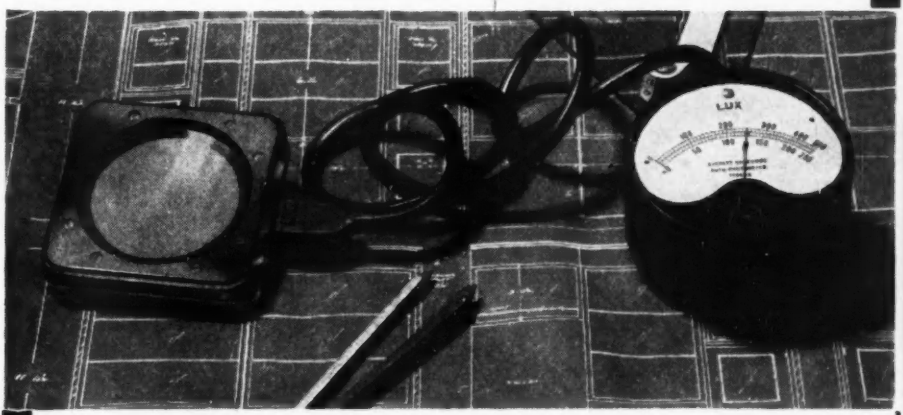
KEMPSTON ELECTRICAL CO LTD

KEMPSTON BEDFORD.

A COMPLETE RANGE

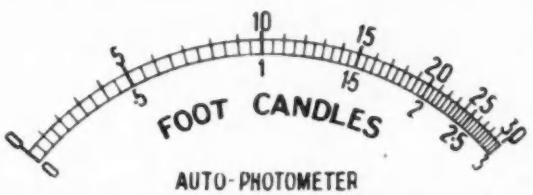
of Photometers

VISUAL AND PHOTOELECTRIC



Above: *Autophotometer Model II. Portable Pattern with separate test surface for direct measurement of illumination.*

On right: *Typical scale showing sensitivity at low illumination values.*



Everett Edgcumbe Photometers are in world-wide use, both in Industrial and Educational Establishments. Apart from specially adapted patterns, the available range includes:

'AUTOPHOTOMETER' Photoelectric Pattern as illustrated.

'CUBE' Integrating Photometer for lumen measurements.

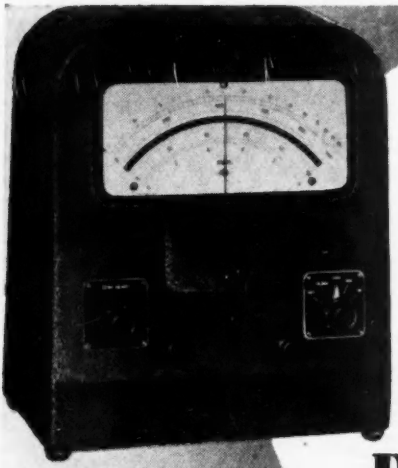
'POLAR CO-ORDINATE' Photometer for light distribution measurements.

CATALOGUE SHEET No 464E

EVERETT EDGCUMBE

E E C

COLINDALE WORKS, LONDON, N.W.9. Tel.: COLINDALE 6045



Pullin industrial Bench type Ohmmeter gives accurate readings independent of supply voltage variations of plus or minus 20%.

Rapid

PRODUCTION TESTING

With its almost linear 8″ scale the Pullin Bench Ohmmeter is the ideal instrument for rapid production testing of a wide range of resistance values.

A selector switch gives an immediate choice of 4 range-scales on the one instrument, 0-10, 0-100, 0-1000, 0-10,000.

Calibration accuracy on all scales being plus or minus 1% of full scale deflection.

PULLIN BENCH TYPE OHMMETER

MEASURING INSTRUMENTS (PULLIN) LTD.
Electrin Works, Winchester St., W.3. ACOrn 4651

MIP

Build your own equipment with

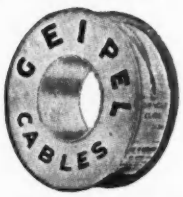
DEXION
SLOTTED ANGLE

★ Can be used over and over again

★ No drilling, measuring or painting

★ Just cut it and bolt it, that's all

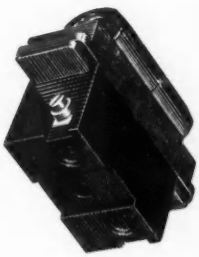
DEXION LIMITED
Triumph House, 189 Regent Street, London, W.1.
TELEPHONE REGENT 4841-5

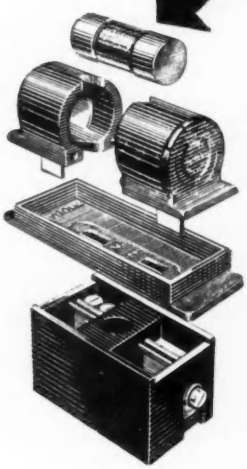


WILLIAM GEIPEL LTD.
156-170 BERMONDSEY ST., S.E.1
FOUNDED IN LONDON 1871

CLANG
THE ARISTOCRATIC ACCESSORY
Electrical Accessories of Superior Design and Sturdy Construction
CLANG LTD. CROWN YARD CRICKLEWOOD
Tel.: Gladstone 4201 N.W.2

little things that count





. . . And who should know it better than Reyrolle who make some of the world's largest switchgear for arduous service. The same care and attention that we lavish on large equipment is spent in producing the less spectacular, but just as useful, accessory electrical equipment. Fuses, switch panels, plugs and sockets — little things maybe, but things that call for accuracy in their manufacture. Reyrolle equipment is nothing if not accurate.

REYROLLE

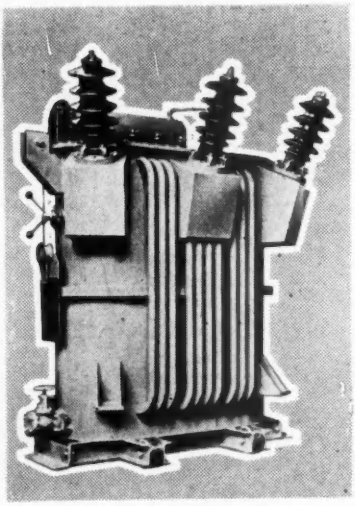
ACCESSORY ELECTRICAL EQUIPMENT

A. REYROLLE & CO. LTD., HEBBURN, CO. DURHAM

CRC 2SP

Electrical Equipment

for INDUSTRY



The DAVENSET trade mark has stood for utterly reliable static rectifying and transforming equipment for almost a quarter of a century.

Rectifiers for battery charging, electro plating, H.T. Precipitation and electrolytic reclamation of metal from scrap, are but a few of the many applications of DAVENSET Rectifier equipments in Industry.

These and power transformers, from the smallest to the medium size units, for power distribution are made at Davenset Electrical Works.

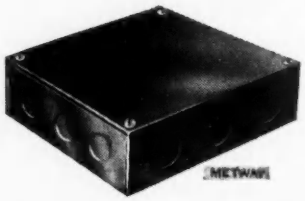
From first to — LAST

PARTRIDGE, WILSON & Co. LTD., DAVENSET ELECTRICAL WORKS, LEICESTER, 5.

DAVENSET

METWAY PRODUCTS
Registered Trade Mark

ADAPTABLE BOXES



PRESSED STEEL OR CAST
OVER SIXTY DIFFERENT SIZES

Send for our **92 Page** List of Conduit Fittings and Wiring Accessories. Please enclose 6d. stamp and ask for

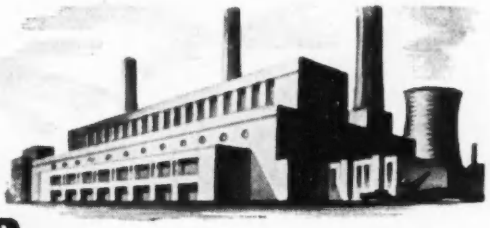
LIST OH/31/T.E.

METWAY ELECTRICAL INDUSTRIES LTD.
KING STREET, BRIGHTON, 1
Tel: Brighton 28366. Grams: 'Metway,' Phone, Brighton

THE NATIONAL FIRE PROTECTION CO., LTD.
Specialists in the protection of motors, switchgear, etc. against
FIRE
Write for free copy of our Electrical Brochure EB.ET.
ESSEX WORKS, FAGGS RD., FELTHAM, MIDDX.
Branches: Birmingham, Leeds, Glasgow, Belfast

BENT TUBES, PIPES & CONDUITS
Whatever your particular needs may be—in BENT TUBES—we will gladly place at your disposal the value of more than 25 years' practical experience of tube bending.
S. N. ENGINEERING CO. LTD.
5a Alsen Place, London N.7 *Phone ARChway 2248*

Instruction Chart
For dealing with apparent death from
ELECTRIC SHOCK
(*In accordance with H.O. Electy. Reg.* 29)
Mounted on strong board, varnished and corded for hanging.
Price 3/- plus 11d. postage (per single copy)
ELECTRICAL TIMES
Sardinia House
SARDINIA STREET · LONDON · W.C.2

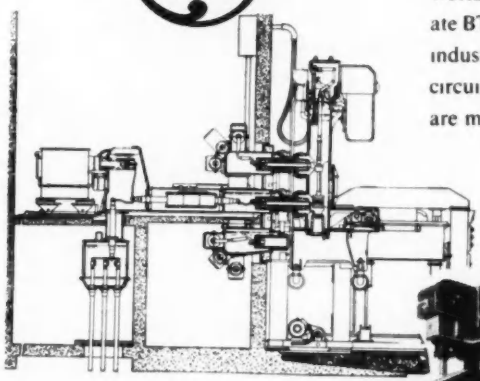


Central Station SWITCHGEAR

by

B T-H

Functional reliability of switchgear associated with the transmission of electric power is of paramount importance. Thus many of the world's largest electric supply systems incorporate BTH switchgear All types from low voltage industrial distribution boards to the largest circuit-breakers for systems up to 300,000 volts are manufactured by BTH.

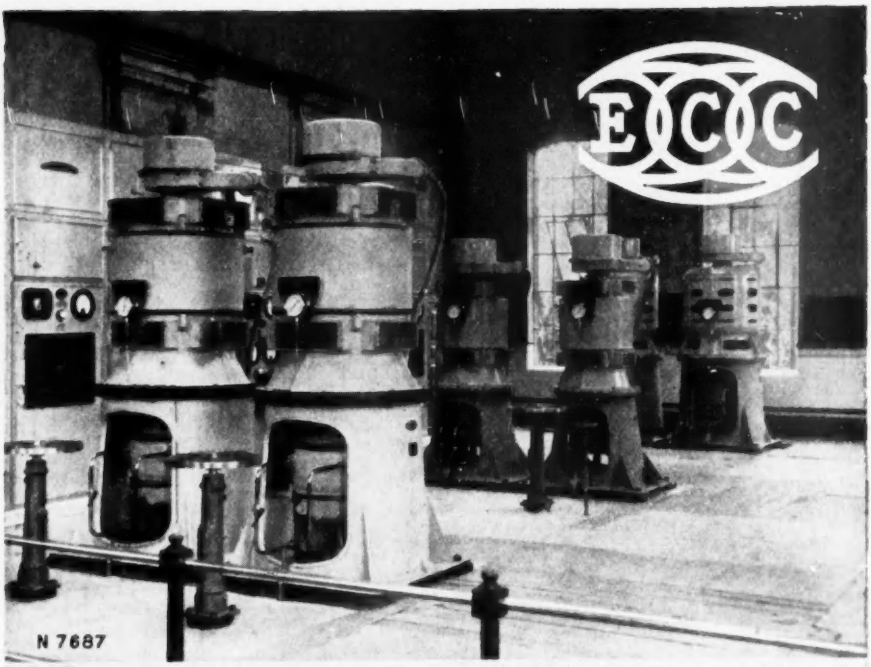


Cross-sectional drawing showing a typical duplicate busbar equipment.

1,000 MVA, 33 kV, class MF59 switchgear installed at the Ocker Hill Power Station of the BEA Midlands Division.

For all important installations
specify BTH switchgear

THE **BRITISH THOMSON-HOUSTON** CO. LTD., WILLESDEN, ENGLAND
Member of the AEI group of companies



PUMPING WATER AT BIRMINGHAM

This illustration is reproduced by permission of the ***BIRMINGHAM CITY WATER DEPARTMENT***

C. R. Risbridger Esq., B.Sc., M.Inst.C.E. Chief Engineer.

Six vertical spindle centrifugal motors driving Sulzer pumps at Frankley Pumping Station.

Two of the motors are of 410 h.p., two of 340 h.p. and two of 170 h.p. capacity.

These motors are supplied from the 400 volts side of 11 kV/400 volt step-down transformers. The electrical equipment comprising motors, H.T. switchgear, step-down transformers, L.T. motor control and distribution switchgear and rectifiers for D.C. services in this station were supplied by E.C.C.

ESTABLISHED 1882

THE ELECTRIC CONSTRUCTION COMPANY LIMITED

E C C

TELEGRAMS: ELECTRIC WOLVERHAMPTON

Head Office and Works: BUSHBURY ENGINEERING WORKS WOLVERHAMPTON ENGLAND

TELEPHONE: WOLVERHAMPTON 21455 (7 LINES)

E C C

Manufacturers of Rotating Electrical Machinery, Switch and Control Gear, Rectifiers and Transformers

London Office: "Bushbury House," 57 Buckingham Gate, S.W.1

Telephone: VICtoria 3482-3

Printed in England for the Proprietors, THE ELECTRICAL TIMES, LTD., by SUN PRINTERS, LTD., London and Watford, Herts, and published at Sardinia House, Sardinia Street, London W.C.2. October 18, 1951

Only the best

Throughout most parts of the world ASHTON CABLES and Flexibles are giving dependable service in home and industry. Whatever the application *only the best is good enough*, that is why you should insist *always* on 'ASHTON'.

ASHTON CABLES are manufactured at our Castle Works under strict laboratory control and to specification B.S.S. No. 7, 1946. Amendment No. 3, August 1949. P.D. 947.

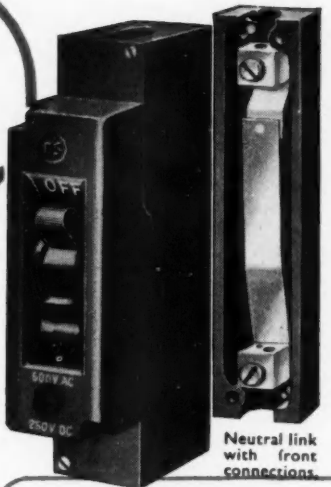
Catalogues and Sample Cards on request

ASHTON

CABLES AND FLEXIBLES.

MADE BY AERIALITE LTD., STALYBRIDGE, CHESHIRE, ENGLAND

Introducing DORMAN *MINIATURE* CIRCUIT BREAKERS



Neutral link with front connections.

DIMENSIONS
5" Length x 1⅝" Width x 3" MAXIMUM PROJECTION

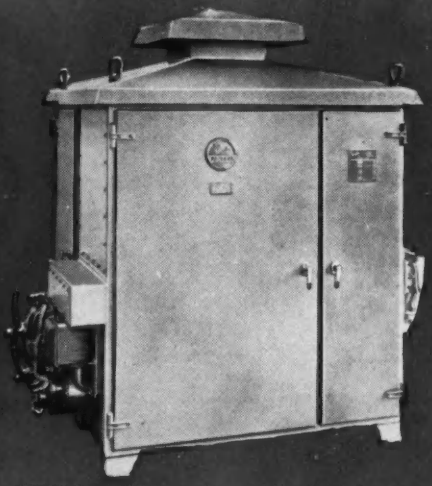
TESTED BY THE NATIONAL PHYSICAL LABORATORY
Designed to give unfailing protection to all types of electrical circuits and equipment up to a maximum current rating of 50 amps at 500 V a.c. or 250 V d.c. On ordinary overloads tripping may be instantaneous or have an inverse time delay characteristic, but in all cases instantaneous tripping occurs on a large overload or short circuit. The mechanism is normally sealed to prevent interference with settings. Neutral mechanism designed as a separate unit, to be fitted underneath the main unit when required. Tested rupturing capacities 10,000 amp at 250 V d.c., 10,000 amp at 440 V a.c. at pf. 0.62 lag.

Write for illustrated folder M.C.B.

DORMAN & SMITH LTD · MANCHESTER · 5

Nevelin

Specialists in the manufacture of Mercury Arc Glass Bulb Rectifiers for all industrial applications.



Rectifiers OF SPECIAL DESIGN

NEVELIN ELECTRIC COMPANY LTD.
PURLEY WAY · CROYDON · SURREY

A "Lancashire Dynamo" Company